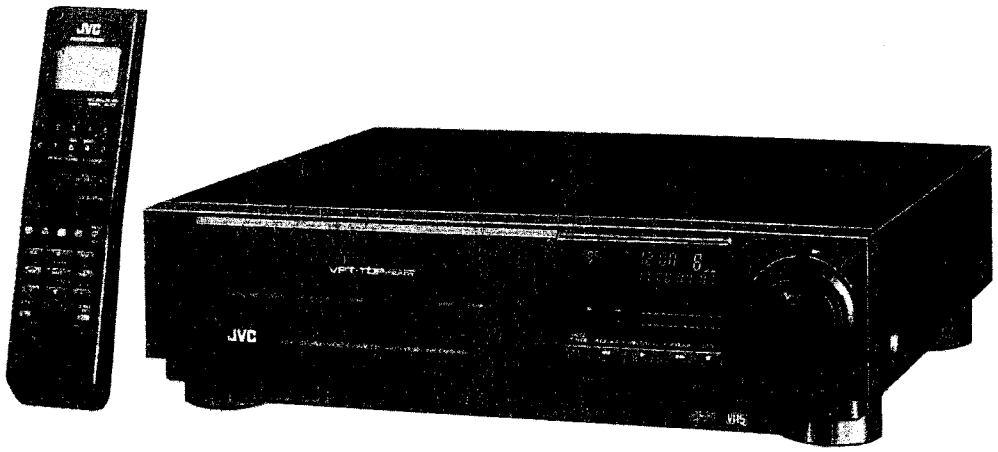
JVC

SERVICE MANUAL

Hi-Fi STEREO VIDEO CASSETTE RECORDER VHS

HR-D950E/EG



HQ
VPT-TOP
TELETEXT PROGRAMMING READY
Digital AV Tracking

SPECIFICATIONS

GENERAL

Power requirement	: 220 V~, 50/60 Hz
Power consumption	: 41 W
Temperature	: 5°C to 40°C (Operating) -20°C to 60°C (Storage)
Operating position	: Horizontal only
Dimensions (WxHxD)	: 435 x 124 x 382 mm
Weight	: 7.3 kg
Tape format	: VHS PAL standard with Hi-Fi audio
Tape width	: 12.65 mm
Tape speed (SP)	: 23.39 mm/sec
(LP)	: 11.70 mm/sec
Maximum recording time (SP)	: 240 min. with E-240 video cassette
(LP)	: 480 min. with E-240 video cassette

VIDEO

Signal system	: PAL colour and CCIR monochrome signals, 625 lines/50 fields
Recording system	: Rotary two-head helical scan system with slant double-azimuth combination video heads
Input	: 0.5 to 2.0 Vp-p, 75 ohms, unbalanced
Output	: 1.0 Vp-p, 75 ohms, unbalanced
Signal-to-noise ratio	: 43 dB (Rohde & Schwarz noise meter) with picture sharpness control at centre position
Horizontal resolution	: 250 lines with picture sharpness control at centre position

AUDIO

Recording system	: Longitudinal track
Input	: Mic: -67 dBs, high impedance, unbalanced : AUDIO EING. connector (RCA x 2): -8 dBs, 50 k-ohms, unbalanced : AUDIO/VIDEO socket (21-pin Peri connector): -3.8 dBs (CENELEC standard), 10 k-ohms, unbalanced
Output	: AUDIO/VIDEO socket (21-pin Peri connector): -3.8 dBs (CENELEC standard), high impedance load : AUDIO AUSG. connector (RCA x 2): -6 dBs, high impedance load, less than 1 k-ohm, unbalanced (100 k-ohms, load)
Frequency range	: 70 Hz to 10,000 Hz

Hi-Fi AUDIO

Recording system	: Deep-layer recording system conforming to stereo Hi-Fi VHS standard
No. of audio channels	: 2 Hi-Fi audio channels (1 normal audio channel)
Frequency response	: 20 Hz to 20,000 Hz
Dynamic range	: More than 90 dB
Wow and flutter	: Less than 0.005 % WRMS

TUNER

Tuning system	: Frequency synthesized tuner
TV channel storage capacity	: 48 positions (+ AUX position "AU")
Channel coverage	: VHF 47 – 111 MHz 111 – 300 MHz UHF 470 – 862 MHz
Aerial output	: UHF channel 36 (adjustable 32 – 40)

TIMER

Clock reference	: Quartz-crystal
Programme capacity	: 1-year/8-programme timer
Memory back-up time	: Minimum 3 min.

ACCESSORIES

Provided accessories	: Aerial cable, Infrared remote control unit, "R6" battery x 2 Audio cable (RCA-RCA)
Optional accessories	: VPV adapter VU-V12E VPT adapter VU-V14E

Specifications shown are for SP mode unless otherwise specified.
Design and specifications subject to change without notice.

COPYRIGHT © 1989 VICTOR COMPANY OF JAPAN, LTD.

No. 82144
October 1989

NOTE: For a technical description, please refer to Technical Guide VTG82047 HR-D950 PAL.

TABLE OF CONTENTS

Section	Title	Page
	Important Safety Precautions	
	INSTRUCTIONS	
	1. DISASSEMBLY AND MECHANISM ADJUSTMENTS	
1.1	DISASSEMBLY	1-1
1.2	MECHANISM ADJUSTMENTS	1-4
1.3	MAIN MECHANISM PARTS	1-5
1.4	INSPECTION AND MAINTENANCE	1-7
1.5	MAIN ASSEMBLY REPLACEMENT	1-8
1.6	ASSEMBLY PROCEDURE OF MECHANISM	1-10
1.7	CONFIRMATION AND ADJUSTMENT	1-12
1.8	TAPE TRANSPORT CHECKS AND ADJUSTMENT PREPARATIONS	1-13
1.9	INTERCHANGEABILITY CHECKS AND ADJUSTMENTS	1-14
	2. ELECTRICAL ADJUSTMENTS	
2.1	PREPARATION	2-1
2.2	CIRCUIT BOARD LOCATION	2-3
2.3	SWITCHING REGULATOR CIRCUIT	2-4
2.4	TIMER CIRCUIT	2-4
2.5	SERVO CIRCUIT	2-5
2.6	VIDEO CIRCUIT	2-6
2.7	AUDIO CIRCUIT	2-11
2.8	TUNER/IF CIRCUIT	2-12
2.9	DEMODULATOR CIRCUIT	2-13
	3. CHARTS AND DIAGRAMS	
3.1	CIRCUIT BOARD LOCATIONS	3-1
3.2	GENERAL INFORMATION	3-2
3.3	MAIN TYPES OF ACTIVE AND PACKAGE CIRCUIT	3-5
3.4	BOARD INTERCONNECTIONS	3-7
3.5	AUDIO BLOCK DIAGRAM	3-11
3.6	MECHANISM CONTROL BLOCK DIAGRAM	3-14
3.7	VIDEO BLOCK DIAGRAM	3-15
3.8	PRE/REC BLOCK DIAGRAM	3-19
3.9	SERVO BLOCK DIAGRAM	3-21
3.10	TIMER, DISPLAY/SWITCH AND SWITCH BLOCK DIAGRAMS	3-23
3.11	POWER SYSTEM BLOCK DIAGRAM	3-25
3.12	SWITCHING REGULATOR SCHEMATIC DIAGRAMS	3-27
3.13	SWITCHING AND REGULATOR CIRCUIT BOARDS	3-29
3.14	MECHANISM CONTROL SCHEMATIC DIAGRAM	3-31
3.15	DECK TERMINAL, CASSETTE HOUSING, RELAY, END SENSOR AND REC SAFETY SCHEMATIC DIAGRAMS	3-33
3.16	DECK TERMINAL, CASSETTE HOUSING, RELAY, END SENSOR, REC SAFETY AND AUDIO/CTL HEAD CIRCUIT BOARDS	3-34
3.17	AUDIO (MAIN), TERMINAL AND JACK SCHEMATIC DIAGRAMS	3-35
3.18	VIDEO (MAIN) SCHEMATIC DIAGRAM	3-40
3.19	MAIN AND TERMINAL CIRCUIT BOARDS	3-43
3.20	VIDEO UNIT SCHEMATIC DIAGRAM	3-45
3.21	VIDEO UNIT CIRCUIT BOARD	3-47
3.22	IF SCHEMATIC DIAGRAM	3-49
3.23	IF CIRCUIT BOARD	3-51
3.24	TUNER CTL SCHEMATIC DIAGRAM	3-53
3.25	TUNER CTL CIRCUIT BOARD	3-55
3.26	DEMODULATOR SCHEMATIC DIAGRAM	3-57
3.27	DEMODULATOR CIRCUIT BOARD	3-59
3.28	TIMER SCHEMATIC DIAGRAM	3-61
3.29	TIMER CIRCUIT BOARD	3-63
3.30	SWITCH, SWITCH/DISPLAY AND POWER SWITCH SCHEMATIC DIAGRAMS	3-65
3.31	SWITCH, SWITCH/DISPLAY, JACK AND POWER SWITCH CIRCUIT BOARDS	3-67
3.32	PRE/REC AND FLYING ERASE SCHEMATIC DIAGRAMS	3-69
3.33	PRE/REC AND FLYING ERASE CIRCUIT BOARDS	3-71
3.34	SERVO SCHEMATIC DIAGRAM	3-73
3.35	SERVO CIRCUIT BOARD	3-75
3.36	AUTO TRACKING SCHEMATIC DIAGRAM	3-77
3.37	AUTO TRACKING CIRCUIT BOARD	3-79
3.38	REMOTE CONTROL SCHEMATIC DIAGRAM	3-81
3.39	RF CONVERTER AND MIX BOOSTER SCHEMATIC DIAGRAM	3-82
	4. EXPLODED VIEWS AND PARTS LIST	
4.1	PACKING ASSEMBLY <M1>	4-1
4.2	CABINET ASSEMBLY <M2>	4-2
4.3	CHASSIS ASSEMBLY <M3>	4-4
4.4	MECHANISM ASSEMBLY <M4>	4-5
	5. ELECTRICAL PARTS LIST	
	SWITCHING/REGULATOR BOARD ASSEMBLY <01> <02>	5-1
	MAIN BOARD ASSEMBLY <03>	5-3
	VIDEO UNIT BOARD ASSEMBLY <05>	5-9
	TERMINAL BOARD ASSEMBLY <06>	5-11
	IF BOARD ASSEMBLY <07>	5-11
	TUNER CONTROL BOARD ASSEMBLY <08>	5-13
	AUDIO CONTROL HEAD BOARD <12>	5-14
	DEMODULATOR BOARD ASSEMBLY <14>	5-14
	TIMER BOARD ASSEMBLY <20>	5-15
	SWITCH BOARD ASSEMBLY <26>	5-16
	SWITCH/DISPLAY, P. SWITCH, JACK BOARD ASSEMBLY <28><25><36>	5-17
	PRE/REC BOARD ASSEMBLY <43>	5-18
	FLYING ERASE BOARD ASSEMBLY <46>	5-19
	SERVO BOARD ASSEMBLY <48>	5-19
	DECK TERMINAL BOARD ASSEMBLY <51><53>	5-22
	RELAY BOARD ASSEMBLY <52>	5-22
	END SENSOR BOARD ASSEMBLY <54>	5-22
	CASSETTE HOUSING BOARD <56>	5-22
	AUTO TRACKING BOARD ASSEMBLY <83>	5-23
	6. TECHNICAL INFORMATIONS	
6.1	MECHANISM CONTROL CIRCUIT	6-1
6.2	TIMER CIRCUIT	6-2

Important Safety Precautions

Prior to shipment from the factory, JVC products are strictly inspected to conform with the recognized product safety and electrical codes of the countries in which they are to be sold. However, in order to maintain such compliance, it is equally important to implement the following precautions when a set is being serviced.

● Precautions during Servicing

1. Locations requiring special caution are denoted by labels and inscriptions on the cabinet, chassis and certain parts of the product. When performing service, be sure to read and comply with these and other cautionary notices appearing in the operation and service manuals.

2. Parts identified by the ⚠ symbol and shaded (▒) parts are critical for safety.
   Replace only with specified part numbers.
   Note: **Parts in this category also include those specified to comply with X-ray emission standards for products using cathode ray tubes and those specified for compliance with various regulations regarding spurious radiation emission.**

3. Fuse replacement caution notice.
   Caution for continued protection against fire hazard.
   Replace only with same type and rated fuse(s) as specified.

4. Use specified internal wiring. Note especially:
   1) Wires covered with PVC tubing
   2) Double insulated wires
   3) High voltage leads

5. Use specified insulating materials for hazardous live parts. Note especially:
   1) Insulation Tape
   2) PVC tubing
   3) Spacers
   4) Insulation sheets for transistors
   5) Barrier

6. When replacing AC primary side components (transformers, power cords, noise blocking capacitors, etc.) wrap ends of wires securely about the terminals before soldering.

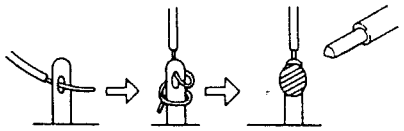


Fig. 1

7. Observe that wires do not contact heat producing parts (heat-sinks, oxide metal film resistors, fusible resistors, etc.)

8. Check that replaced wires do not contact sharp edged or pointed parts.

9. When a power cord has been replaced, check that 10–15 kg of force in any direction will not loosen it.

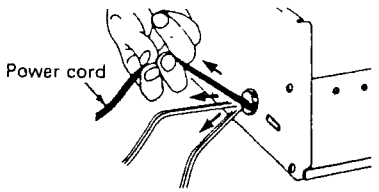


Fig. 2

10. Also check areas surrounding repaired locations.

11. Products using cathode ray tubes (CRTs)
    In regard to such products, the cathode ray tubes themselves, the high voltage circuits, and related circuits are specified for compliance with recognized codes pertaining to X-ray emission. Consequently, when servicing these products, replace the cathode ray tubes and other parts with only the specified parts. Under no circumstances attempt to modify these circuits. Unauthorized modification can increase the high voltage value and cause X-ray emission from the cathode ray tube.

12. Crimp type wire connector
    In such cases as when replacing the power transformer in sets where the connections between the power cord and power transformer primary lead wires are performed using crimp type connectors, if replacing the connectors is unavoidable, in order to prevent safety hazards, perform carefully and precisely according to the following steps.

    1) **Connector part number** : E03830-001
    2) **Required tool** : Connector crimping tool of the proper type which will not damage insulated parts.
    3) **Replacement procedure**
       (1) Remove the old connector by cutting the wires at a point close to the connector.
       Important : Do not reuse a connector (discard it).

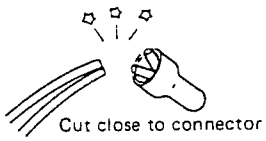


Fig. 3

(2) Strip about 15 mm of the insulation from the ends of the wires. If the wires are stranded, twist the strands to avoid frayed conductors.

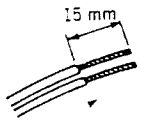


Fig. 4

(3) Align the lengths of the wires to be connected. Insert the wires fully into the connector.

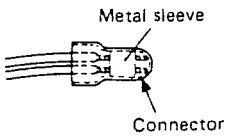


Fig. 5

(4) As shown in Fig. 6, use the crimping tool to crimp the metal sleeve at the center position. Be sure to crimp fully to the complete closure of the tool.

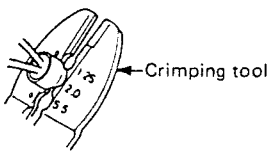


Fig. 6

(5) Check the four points noted in Fig. 7.

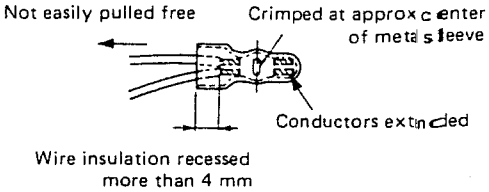

Not easily pulled free
Crimped at approx center of metal sleeve
Conductors extended
Wire insulation recessed more than 4 mm

Fig. 7

● Safety Check after Servicing

Examine the area surrounding the repaired location for damage or deterioration. Observe that screws, parts and wires have been returned to original positions, Afterwards, perform the following tests and confirm the specified values in order to verify compliance with safety standards.

1. **Insulation resistance test**
   Confirm the specified insulation resistance or greater between power cord plug prongs and externally exposed parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table 1 below.

2. **Dielectric strength test**
   Confirm specified dielectric strength or greater between power cord plug prongs and exposed accessible parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table 1 below.

3. **Clearance distance**
   When replacing primary circuit components, confirm specified clearance distance (d), (d') between soldered terminals, and between terminals and surrounding metallic parts. See table 1 below.

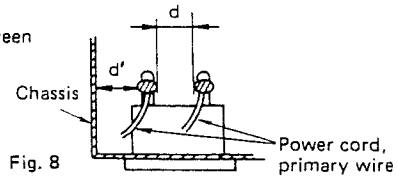


Fig. 8

4. **Leakage current test**
   Confirm specified or lower leakage current between earth ground/power cord plug prongs and externally exposed accessible parts (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.).
   Measuring Method: (Power ON)
   Insert load Z between earth ground/power cord plug prongs and externally exposed accessible parts. Use an AC voltmeter to measure across both terminals of load Z. See figure 9 and following table 2.

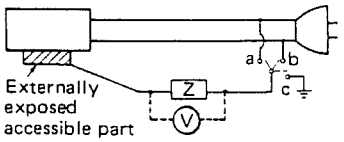


Fig. 9

5. **Grounding (Class I model only)**
   Confirm specified or lower grounding impedance between earth pin in AC inlet and externally exposed accessible parts (Video in, Video out, Audio in, Audio out or Fixing screw etc.).
   Measuring Method:
   Connect milli ohm meter between earth pin in AC inlet and exposed accessible parts. See figure 10 and grounding specifications.

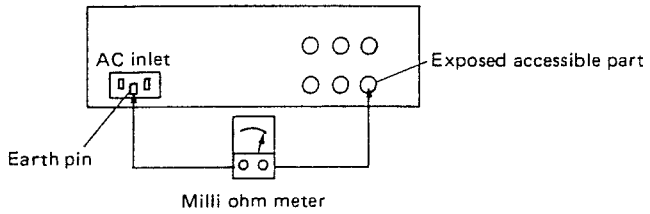


Fig. 10

Grounding Specifications

Region	Grounding Impedance (Z)
USA & Canada	Z ≦ 0.1 ohm
Europe & Australia	Z ≦ 0.5 ohm

AC Line Voltage	Region	Insulation Resistance (R)	Dielectric Strength	Clearance Distance (d), (d')
100 V	Japan	R ≧ 1 MΩ/500 V DC	AC 1 kV 1 minute	d, d' ≧ 3 mm
100 to 240 V			AC 1.5 kV 1 minute	d, d' ≧ 4 mm
110 to 130 V	USA & Canada	–	AC 900 V 1 minute	d, d' ≧ 3.2 mm
110 to 130 V 200 to 240 V	Europe & Australia	R ≧ 10 MΩ /500 V DC	AC 3 kV 1 minute (Class II) AC 1.5 kV 1 minute (Class I)	d ≧ 4 mm d' ≧ 8 mm (Power cord) d' ≧ 6 mm (Primary wire)

Table 1 Specifications for each region

AC Line Voltage	Region	Load Z	Leakage Current (i)	a, b, c
100 V	Japan	1 kΩ	i ≦ 1 mA rms	Exposed accessible parts
110 to 130 V	USA & Canada	0.15 μF, 1.5 kΩ	i ≦ 0.5 mA rms	Exposed accessible parts
110 to 130 V 220 to 240 V	Europe & Australia	2 kΩ	i ≦ 0.7 mA peak i ≦ 2 mA dc	Antenna earth terminals
		50 kΩ	i ≦ 0.7 mA peak i ≦ 2 mA dc	Other terminals

Table 2 Leakage current specifications for each region

Note: These tables are unofficial and for reference only. Be sure to confirm the precise values for your particular country and locality.

SAFETY PRECAUTIONS

The rating plate and the safety caution are on the rear of the unit.

WARNING – DANGEROUS VOLTAGE INSIDE
WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE.

IMPORTANT (In the United Kingdom)
Mains Supply (240 V~, 50 Hz only)

IMPORTANT

Do not make any connection to the Larger Terminal coded E or Green. The wires in the mains lead are coloured in accordance with the following code:

Blue to N (Neutral) or Black
Brown to L (Live) or Red

If these colours do not correspond with the terminal identifications of your plug, connect as follows:
Blue wire to terminal coded N (Neutral) or coloured Black.
Brown wire to terminal coded L (Live) or coloured Red.
If in doubt – consult a competent electrician.

Omkopplaren BETRIEB på denna apparat är sekundärt kopplad och skiljer inte apparaten från nätet i läge BETRIEB OFF.

The BETRIEB button does not completely shut off mains power from the unit, but switches operating current on and off.

BEMAERK: I stilling OFF er apparatet stadig forbundet med lysnettet. Hvis det ønskes fuldstændig afbrudt skal netledningen trækkes ud.

This unit is produced to comply with Directive 82/499/EEC, CISPR Pub. 13 and Pub. 14 and Standard IEC 65.

WARNING
The switched AC outlet should not be used for connection of TVs and other apparatus in which unintended switching could result in fire or other hazard.

Video tapes recorded with this video recorder in the LP (Long Play) mode cannot be played back on a single-speed video recorder.

CAUTION

- When you are not using the recorder for a long period of time, it is recommended that you disconnect the power cord from the AC outlet.
- Dangerous voltage inside. Refer internal servicing to qualified service personnel. To prevent electric shock or fire hazard, remove the power cord from the AC outlet prior to connecting or disconnecting any signal lead or aerial.

CONTENTS

Safety precautions 37
Precautions 38
Features 39
Controls, indicators and connectors 40
Connections 45
Video channel setting 46
Loading and unloading a cassette 46
Clock setting 47
Operating the built-in tuner 49
Information on the HR-D950EG's audio system 51
Child lock function 53
Playing back a video cassette 54
Special-effects playback 55
Basic operation for recording TV programmes 57
Other recording possibilities 58
24-hour instant timer recording 59
Next-function memory 59
Index search function 60
Intro search function 60
Realtime tape counter 61
Counter memory function/lap time indication 61
Automatic timer recording 62
VPS recording 64
Audio dubbing 64
Recording from an external source 65
Duet editing 66
Preroll editing 67
Fade-in/fade-out 68
In case of difficulty 69
Head cleaning 70
Specifications 71
Teletext compatibility 72

- Only cassettes marked "VHS" can be used with this video cassette recorder.
- HQ VHS is compatible with existing VHS equipment.

COPYRIGHT © 1989 VICTOR COMPANY OF JAPAN, LTD.
Printed in Japan

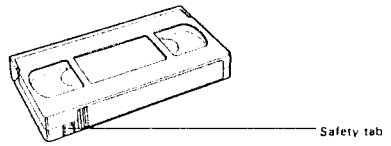
PRECAUTIONS

Handling and storage

- Avoid using the recorder under the following conditions:
  - extremely hot, cold or humid places,
  - dusty places,
  - near appliances generating strong magnetic fields,
  - places subject to vibrations, and
  - poorly ventilated places.
- Be careful of moisture condensation.
- Avoid using the recorder immediately after moving from a cold place to a warm place. The water vapour in warm air will condense on the still-cold video head drum and tape guides and may cause damage to the tape and the recorder.
- Handle the recorder carefully
  - Do not block the ventilation openings.
  - Do not place anything heavy on the recorder.
  - Do not place anything which might spill and cause trouble on the top cover of the recorder.
  - Use in horizontal (flat) position only.
- In case of transportation,
  - Avoid violent shocks to the recorder during packing and transportation.
  - Before packing, be sure to remove the cassette from the recorder.

Video cassettes

- This recorder employs VHS-type cassettes only.
  E-240 for 4 hours/8 hours, E-180 for 3 hours/6 hours, E-120 for 2 hours/4 hours, E-90 for 1 hour and 30 minutes/3 hours, E-60 for 1 hour/2 hours and E-30 for 30 minutes/1 hour of recording.
- Video cassettes are equipped with a safety tab to prevent accidental erasure. When the tab is removed, recording cannot be performed. If you wish to record on a cassette whose tab has already been removed, use adhesive tape to block the hole.



Safety tab

- Avoid exposing the cassettes to direct sunlight. Keep them away from heaters.
- Avoid extreme humidity, violent vibrations or shocks, strong magnetic fields (near a motor, transformer or magnet) and dusty places.
- Place the cassettes in cassette cases and position vertically.

Moisture condensation

- If you pour a cold liquid into a glass, water vapour in the air will condense on the surface of the glass. This is called moisture condensation.
- Moisture condensation on the head drum, one of the most crucial parts of the video recorder, will cause damage to the tape.
- Moisture condensation is apt to occur under the following conditions:
  - when the recorder is moved from a cold place to a warm place, and
  - under extremely humid conditions.
- In conditions where moisture condensation may occur, keep the power cord plugged in an AC outlet and the power switched on; this will help prevent condensation from occurring. When condensation has occurred, it will not evaporate quickly once the power is switched on. Wait a few hours for the recorder to become dry.

Operation

- When a cassette is loaded, the power is switched on automatically.
- The cassette can be unloaded even when the power is off. Pressing the CASSETTE button turns the power on and, after ejection of the cassette, shuts it off automatically in this case.
- As long as the SCHALTUHR button is engaged with the TIMER indicator lit, the BETRIEB and cassette buttons have no effect and unloading of a cassette is not possible. If a cassette has not yet been inserted, simply insert a cassette; the power will be switched on to load the cassette properly and, after completion of automatic loading, the Timer Recording Standby mode will be engaged with power off.

Remote control unit

- Avoid violent shocks, especially take care not to drop the unit.
- Take care not to allow liquid to spill into the unit.
- Do not place heavy objects on the unit.
- Avoid leaving the unit in places subject to direct sunlight or extremely high temperatures.

WARNING
There are two different types of SECAM colour systems; SECAM-L, used in FRANCE (also called SECAM-West), and SECAM-B, used in the GDR, e.g. (also called SECAM-East).

1. This recorder can also receive SECAM-B colour television signals for recording and playback.
2. Recordings made of SECAM-B television signals produce monochrome pictures if played back on a video recorder of SECAM-L standard, or do not produce normal colour pictures if played back on a PAL video recorder with SECAM-B system incorporated (even if the TV set is SECAM-compatible).
3. SECAM-L prerecorded cassettes or recordings made with a SECAM-L video recorder produce monochrome *pictures when played back with this recorder.*
4. This recorder cannot be used for the SECAM-L standard. Use a SECAM-L recorder to record SECAM-L signals.

FEATURES

High-quality pictures

- **HQ (High Quality) System technologies** with DE (Detail Enhancer), and WCL (20 % higher white clip level), and YNR (Luminance Signal Noise Reduction).
- **Digital AV Tracking** to constantly maintain the best possible Hi-Fi audio and video tracking: provides optimum pictures from most recorded tapes. Especially useful with rental software. Manual override is also possible.
- **DA-4 head system with TS (Tape Stabilizing) head drum** for optimum twin-speed recording and playback.
- **Variable-speed noiseless slow motion** at 1/7, 1/12, 1/17, 1/22, and 1/27 normal speed in both directions.
- **Variable-speed search** at 2, 3, 5 and 9 times normal speed in both directions.
- **Double-speed forward playback and normal-speed reverse playback.**
- Picture sharpness control.

High-quality sound

- **Hi-Fi VHS Stereo sound with dynamic range of more than 90 dB.**
- **Hi-Fi Audio Long Play mode** for up to 8 hours of Hi-Fi stereo sound recording with a single video cassette.
- **Hi-Fi recording level control** with ALC switch.

Editing features

- **Jog/Shuttle dials** for manual speed control during visual search. Allows pinpoint location of edit-in and edit-out points.
- **Duet Editing system:** a single remote control command controls two JVC decks simultaneously – one for playback and one for recording – for simplified editing operation.
- **Flying erase head** to erase the precise portions of pre-recorded material which are to be re-recorded for smooth, distortion-free edits.
- **Insert editing** to insert a new recording into a section of previously recorded material with no overlap or distortion.
- **White fader function** to produce fade-in and fade-out effects in edits.
- **Audio dubbing** to dub a new soundtrack on the normal audio track without affecting the Hi-Fi or video tracks.
- **Retake function** to directly switch from the Record-Pause mode to Search for easy, trouble-free re-recording.
- **Automatic backspace editing by Zero Frame Editing sytem** for clean assemble edits.
- Pause remote control input connector for JVC Video-Movie's Master Edit Control system.
- **Pause remote control output connector for synchronized preroll operation** of another JVC deck when editing (Specific decks only).
- Edit switch for obtaining better results in multi-generation dubs.

Programming features

- **VPT/VPS compatibility** (with optional adapter).
  - TOP teletext timer programming.
  - Teletext timer programming with on-screen title display.
  - Teletext viewing with multiple page access capabilities.
  - Colour on-screen display for timer programming and teletext page setting.
  - Four coloured keys on remote control for easy Teletext operation.
- **LCD remote programming by data transfer.**

Remote control features

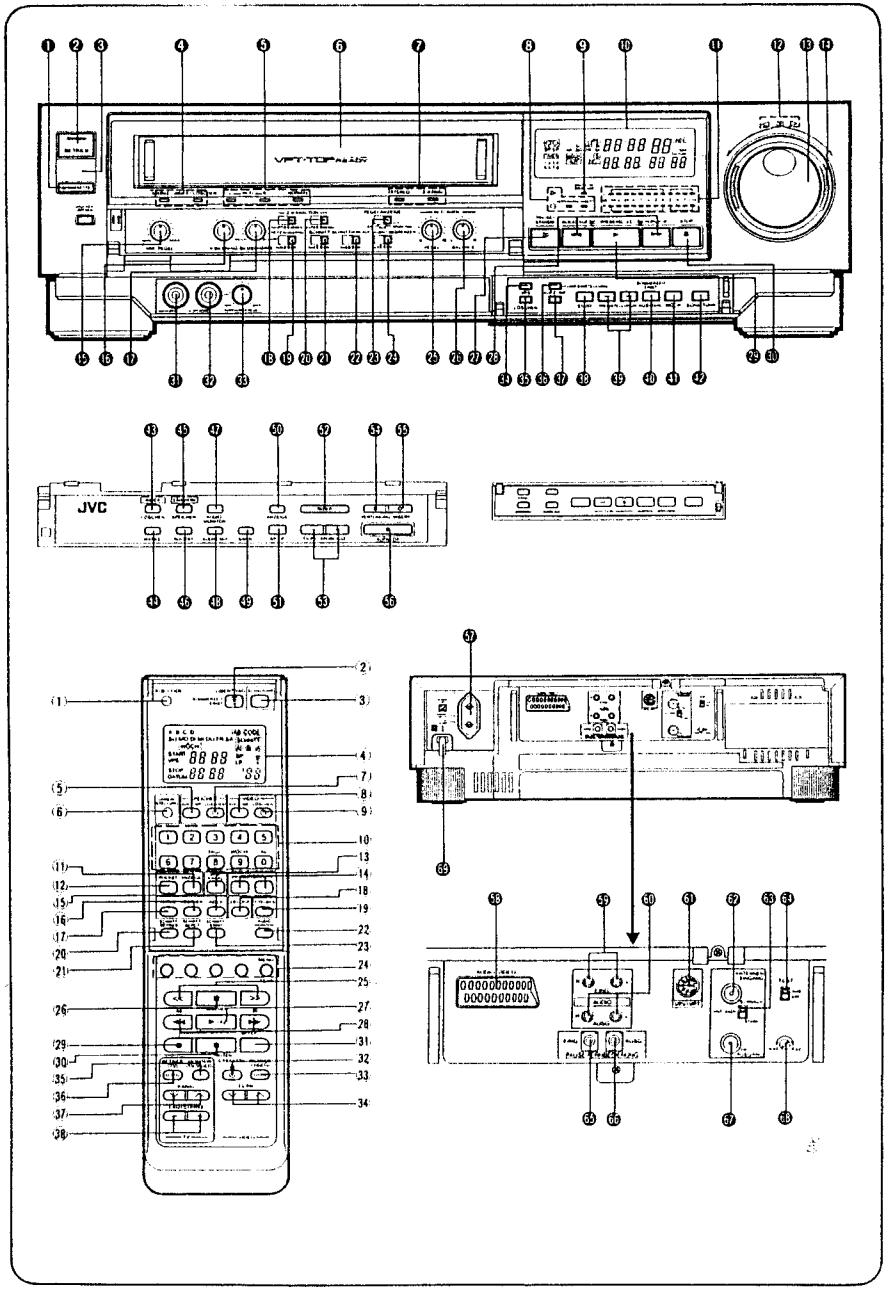
- **Full control over teletext operations.**
- **Independent timer programming** with built-in LCD and 4 programme memories.
- **Direct access to VCR's timer programmes** for checking and cancelling.
- **Built-in clock,** tape eject and Index Mark/Erase controls.
- **TV control** for power on/off, volume, channel and AV mode selection (designated TVs only).
- **Instant A/B code switching** with indicator on LCD for controlling two JVC decks independently from a single remote control.

Tape access features

- **VHS Index Search System with manual mark/erase facilities.**
- **Automatic location** of up to 9 coded programmes.
- **Realtime tape counter.**
- **Intro Search, Realtime Go-To and Search.**
- **Half-loading mechanism** for quick tape access.
- Counter memory, Shuttle Search with lock function.

Other value features

- PLL frequency synthesized wide-band cable tuner with 48-channel storage capacity.
- Sound-Multiplex capability.
- 1-Year/8-event programmable timer.
- 24-Hour instant timer for quick setting to record a programme which starts within 24 hours.
- Instant "summer time" adjustment.
- Child Lock system.
- Switchable AC outlet.
- Automatic functions including Next-Function Memory.
- On-screen record-pause mode display.



CONTROLS, INDICATORS AND CONNECTORS

Refer to diagrams on the front foldout page.

Front Panel

❶ Eject button (CASSETTE)
Press while in the Stop mode to eject the cassette.

❷ Operate button (BETRIEB) with LED indicator
Press to apply operating power to the recorder. Loading a cassette also turns the power on.

❸ Infrared beam receiving window

❹ INDEX indicators
INDEX MARKE: Blinks while an index code is being recorded.
INDEX LÖSCHEN: Blinks while an index code is being erased.

❺ Audio monitor indicators
L–Hi-Fi–R: Hi-Fi "L", "R", or both "L" and "R" indicators light, depending on the setting of the AUDIO-MONITOR and AUDIO-MIX buttons, ⓱ and ㊻ .
NORMAL: Lights depending on the setting of the AUDIO-MIX button ㊽ .

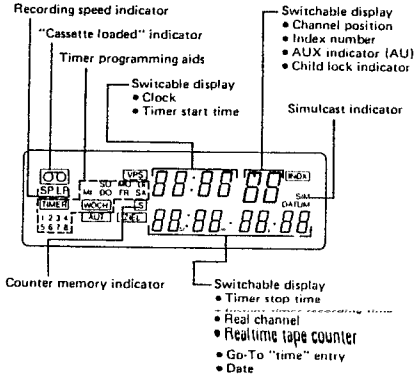
❻ Cassette loading slot
Insert a VHS cassette. The door will close and the "cassette loaded" indicator will appear on the FDP (fluorescent display panel).

❼ STEREO/2-KANAL indicators
STEREO: Lights when a stereo programme is being received.
2-KANAL: Lights when a bilingual programme is being received.

❽ Mode indicators
► (PLAY): Lights in the Play or Double-Speed Play mode. Also lights in the Record mode together with the Record indicator.
● (RECORD): Lights in the Record mode together with the Play indicator.
VERTONUNG: Lights in the Audio Dub mode.
INSERT: Lights in the Insert Edit mode.

❾ DIGITAL-AV-SPURLAGE
Lights in the Digital AV Tracking mode. Blinks while adjusting.

❿ Fluorescent Display Panel (FDP)



⓫ Audio level indicators/Hi-Fi tracking meter
See pages 52.

⓬ Still/Jog/Search indicators
Light to show tape status and direction of movement.

⓭ JOG dial (inner control)
Turn in the Still mode for jog search. See page 55.

⓮ SHUTTLE ring (outer control)
Turn in the Play or Still mode for variable-speed search. Releasing the ring engages the Still mode. See page 55.

⓯ Microphone level control (MIK. PEGEL)
For control of the microphone input level for microphone-mix recording via the Microphone jack ㉛ . When making an adjustment, connect a pair of headphones to monitor the input level.

⓰ Vertical Lock control (V-BILDFANG)
When operating in the Still mode, turn this control to reduce vertical vibrations of the picture, if observed.

⓱ Picture sharpness control (BILDSCHÄPFE)
Turn this knob clockwise to make the picture sharper. Turn counterclockwise to give the picture a softer tone. Effective only for playback pictures. (No effect on recording.)

⓲ Tuner sound select Main/Sub switch (2-KANAL-TON HAUPT/NEBEN)
HAUPT: To record the main soundtrack (local language).
NEBEN: To record the sub soundtrack (foreign language).
(See pages 51 and 58.)

⓳ AC online switch (NETZAUSGANG)
AUS position: Power is available from the rear panel AC outlet regardless of whether the recorder is on or off.
EIN position: Power is available from the rear panel AC outlet only when the recorder is on. When used in combination with the built-in timer, this enables timer-controlled power supply for the connected equipment.

⓴ Tuner sound select Auto/Mono switch (2-KANAL-TON AUTO/MONO)
Set to MONO when the quality of the stereo sound being received is poor. The broadcast will be received in monaural with improved results. (See page 58.)

㉑ Edit switch (SCHNITT)
Normally set to OFF. For making multi-generation dubs, set it to the ON position. (See page 67.)

㉒ Pre-roll switch (SCHNITT-VORLAUF)
Set to ON for preroll editing. Normally set to OFF. (See page 67.)

㉓ Level indicator switch (PEGELANZEIGE)
Selects the function of the audio level indicators/Hi-Fi tracking meter. (See page 52.)

㉔ Automatic level control switch (AUDIO-BEGRENZER)
Set to AUS when adjusting the hi-fi audio recording level manually.

㉕ Hi-Fi audio recording level control (Hi-Fi AUFN. PEGEL)
Turn this control knob referring to the audio level indicators on the display panel. When the indicators light up to or near 1 dB for the loudest input signal, the recording level is optimum.

㉖ Hi-Fi audio recording balance control (Hi-Fi AUFN. BALANCE)
Adjusts the L and R channels relative to each other. Turn counterclockwise to boost the hi-fi audio left-channel recording level, clockwise to boost the right-channel recording level.

㉗ Pause/Still button (PAUSE/STANDB.) with LED indicator
- Press while in the Record mode to stop the tape temporarily to avoid recording of unwanted material.
- Press while in the Play mode to view a still picture.
- The still picture can be advanced each time this button is pressed.

㉘ Rewind (RÜCKLAUF)/Fast-Forward (VORLAUF)/Shuttle Search buttons
- Press while in the Stop mode to rewind or fast-forward the tape.
- Press while in the Play mode for Shuttle Search in the reverse or forward direction.
- Press while in the Record-Pause mode to engage the Retake mode. See page 57.

㉙ Play/X2 button (WIEDERG./X2)
- Press once to play back a tape.
- Press again for double-speed playback.
- Press to cancel the Pause/Still, Shuttle Search or Double-Speed mode. (See page 56.)
- Press to start recording from the Record-Pause mode.
- Press to start audio dubbing from the Audio Dub Stand-by mode.
- Press to start insert editing from the Insert Edit Standby mode.

㉚ STOP button
Press this button to stop tape playback or recording.

㉛ Microphone jack (MIKROFON)
Connect a microphone for audio dubbing.

㉜ Headphone jack (KOPFHÖRER)
Connect a set of headphones for monitoring or private listening.

㉝ Headphone level control (KOPFHÖRER PEGEL)
Adjusts the level of audio output from the headphone jack.

㉞ VPS/Channel set button (VPS/KANAL)
This is a dual-function button.
- as a KANAL button – press to engage the Real Channel mode.
- as a VPS button – press to enter the VPS command while in the Timer Set mode.

㉟ Cancel/Skip button (LÖSCHEN/SPRINGEN)
This is a dual-function button.
- as a LÖSCHEN button – press to cancel the programmed data in the Timer Set mode.
- as a SPRINGEN button – press to skip unnecessary channels in the Real Channel mode.

㊱ Clock adjust/Programme button (UHR-EINSTELLUNG/AUFZ. NR.)
Press to change the recorder's mode in the following order: Clock mode, Timer Set mode, Clock Set mode, then return to the Clock mode.

㊲ Search button (SUCHLAUF)
Press to initiate real channel automatic scan tuning. (See page 50.)

㊳ Start button (START)
Press to engage the 24-Hour Instant Timer Set mode. (See page 66.)

㊴ Set/Fine tuning buttons (-/+) (EINSTELLUNG/FEIN)
These are dual-function buttons.
- as EINSTELLUNG buttons – press to set the correct data in the Clock Set or Timer Set mode.
- as FEIN tuning buttons – press to shift the frequency in either direction to fine-tune in a specific station in the Real Channel mode.

㊵ Summer time adjust/Select button (SOMMERZEIT EINST./AUSWAHL)
This is a dual-function button.
- as a SOMMERZEIT EINST. button – press and quickly release to advance the clock by one hour, hold it pressed for 2 seconds to set the clock back by one hour (see page 47).
- as a AUSWAHL button – press to select the item to be set in the Clock Set, Real Channel or Timer Set mode.

㊶ Repeat/Store button (WÖCH./SPEICHERN)
This is a dual-function button.
- as a WÖCH. button – press to enter the repeat command in the Timer Set mode.
- as a SPEICHERN button – press to store the tuned-in channel in the Real Channel mode.

㊷ Timer button (SCHALTUHR)
Press to engage the Timer Standby mode.

㊸ Index erase button (INDEX LÖSCHEN)
Press during playback to erase an index code. (See page 60.)

㊹ Index mark button (INDEX MARKE)
Press during playback or recording to put an index code onto the tape. (See page 60.)

㊺ Counter memory button (ZAHLWERK SPEICHER)
Press to engage the Counter Memory mode, "S" will appear on the FDP and the tape will stop automatically at the counter reading of "0St 00M 00S" when rewinding or fast-forwarding.

㊻ Counter reset button (ZÄHLWERK RÜCST.)
Press to reset the realtime counter reading to "0St 00M 00S".

㊼ Audio monitor button (AUDIO-MONITOR)
Each time this button is pressed, the audio channel to be output changes and is indicated by the L and R indicators on the FDP. (See page 53.)

㊽ Audio mix button (AUDIO-MIX)
Press to select for listening among either hi-fi or normal soundtracks or a mixture of the two. (See page 53.)

㊾ Simulcast button (SIMUL)
To record FM simulcast TV programmes, press this button (anytime, except when in the AUX mode) to set to the simulcast mode. "SIM" will light on the FDP, and the video from the built-in tuner and the hi-fi audio signlas from the rear panel AUDIO EING. connectors will be recorded. (See page 58.)

㊿ Display button (ANZEIGE)
Press to switch the display between the realtime tape counter and date. Also press to change the display from the Timer Set mode to the Clock mode.

(51) SP/LP button
Press to select the recording speed (SP or LP).

(52) FADER button
Press to apply either white fade-in or fade-out effects. See page 68.

(53) TV programme/Tracking buttons (TV PR./SPURLAGE)
These are dual-function buttons.
- as TV PR. buttons – press either button to scan to a desired channel.
- as SPURLAGE buttons – press to minimize noise bars, if *observed, during playback (for automatic digital AV* tracking information, refer to page 54).

(54) Audio dubbing button (VERTONUNG)
Press while in the Still mode, then press the WIEDERG./X2 button for audio dubbing.

㉕ **Insert button (INSERT)**
Press for insert editing. (See page 68.)

㉖ **Record/Instant Timer Record button (AUFN./DA)**
- Press once to start recording.
- Press twice to engage the Instant Timer Recording mode.
- Also use to set the required recording time in the 24-Hour Instant Timer Set mode.

Rear Panel

㊼ **AC outlet (GESCHALTET)**
Connect the power cord of other audio or video equipment (such as an FM tuner) requiring less than 2 amperes of power.
Warning:
The switched AC outlet should not be used for connection of TVs and other apparatus in which unintended switching could result in fire or other hazard.
This outlet is controlled by the NETZAUSGANG switch ㊾. When the NETZAUSGANG switch is set to AUS, this outlet supplies power (220 V~, 50/60 Hz) regardless of the BETRIEB button setting as long as the power cord of the recorder is plugged in.
When the NETZAUSGANG switch is set to EIN, this outlet supplies power only when the recorder is on.

㊽ **AUDIO/VIDEO socket**
A 21-pin standardised audio/video input/output socket for AV connection to a TV or a 2nd video recorder. The input from this socket can be recorded in the AUX (AV) mode engaged by obtaining "AU" in the channel display.

㊾ **Audio input connectors (AUDIO EING.)**
Connect an audio tape recorder or other audio sources for recording sound.

㊿ **Audio output connectors (AUDIO AUSG.)**
Both hi-fi and normal audio signals can be obtained from these connectors. The output can be selected with the AUDIO MONITOR button ㉒ and button ㊻ .

(51) **VPV/VPT connector**
Connect the optional VPT (VPV) adapter for decoding teletext programmes and for teletext timer programming.

(52) **Aerial input connector (ANTENNEN-EINGANG)**
Connect an aerial to this connector.

(53) **Attenuator switch (ANT. SIGN.)**
Set to SCHWACH to receive broadcasts from distant stations. Set to STARK to receive broadcasts of high field strength.

(54) **TEST signal switch**
Set to EIN when tuning your TV receiver for the video channel. A test signal in the form of two vertical white bars will be available.

(55) **Pause in terminal (PAUSE FERNBEDIENUNG EING.)**
When using the HR-D950EG as the source player, connect to the PAUSE OUT terminal of a second VCR (if so-equipped) for synchronized preroll operation. This terminal can also be used for editing from a JVC VideoMovie camera/recorder using the Master Edit Control system.

(56) **Pause out terminal (PAUSE FERNBEDIENUNG AUSG.)**
Connect to the REMOTE PAUSE terminal of a second VCR (if so-equipped) for synchronized preroll operation.

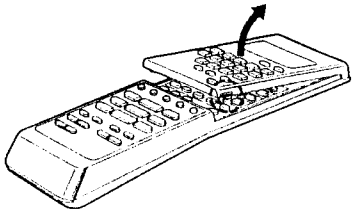
(57) **RF output connector (HF-AUSGANG)**
Connect to the aerial terminal of a TV receiver through the aerial cable (provided).

(58) **RF converter frequency adjustment screw (K40 – K32)**
(See page 46.)

(59) **Power cord**

Remote Control Unit

Grasp the cover where the side tab is located and swing open the cover.

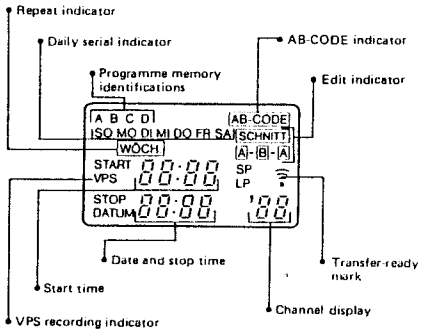


(1) **A/B code button (A/B-CODE)**
When using two JVC video decks, press to switch this remote control from the "A" mode to "B" mode, or vice versa, depending on the deck to be controlled. (See page 44 and 66.)

(2) **Transfer/Summer time adjust button (ÜBERTRAG/SOMMERZEIT EINST.)**
- as an ÜBERTRAG button – press to transfer the data held in the remote control's timer memory to the recorder.
- as a SOMMERZEIT EINST. button – press to adjust the remote control's clock to the summer time setting. (See page 48.)

(3) **Timer button (SCHALTUHR)**
Functions same as ⑰ .

(4) **LCD (Liquid Crystal Display) panel**
Refer to this panel when programming the remote control's built-in timer memory.



(5) **Memory programme button (SPEICHER AUFZ. NR.)**
Press to programme the remote control's timer memory.

(6) **Clock adjust button (UHREINSTELLUNG)**
Press to adjust the clock of the remote control.

(7) **Memory cancel button (SPEICHER LÖSCHEN)**
Press to cancel the programmed data in the remote control's timer memory.

(8) **Video programme button (VIDEO AUFZ. NR.)**
Press to engage the recorder's Timer Set mode.

(9) **Video cancel button (VIDEO LÖSCHEN)**
Press to cancel the programmed data held in the recorder's timer memory.

(10) **Multi-purpose numeric keys**

Clock setting:	See page 48.
Channel selection:	See page 49.
Timer Programming:	See page 63.
Realtime Go-To and Search functions:	See page 61.
Index Search:	See page 60.
External Source recording:	See page 65.

(11) **Display button (ANZEIGE)**
Press to switch the display between the realtime tape counter and date.
Also press to change the display from the Timer Set mode to the Clock mode.

(12) **Counter reset button (RÜCKST.)**
Press to reset the Realtime Counter display to "0St 00M 00S".

(13) **VPS/Channel button (VPS/KANAL)**
Functions same as ⑱ .

(14) **Cursor (|← / →|) buttons (CURSOR)**
When setting the timer, use these buttons to move the cursor to the position for data entry.

(15) **INDEX button**
Press to engage the Index Search mode. (See page 60.)

(16) **Erase button (LÖSCHEN)**
Press during playback to erase an index code. (See page 60.)

(17) **Mark button (MARKE)**
Press during playback or recording to put an index code onto the tape. (See page 60.)

(18) **Go-To button (ZIELLAUF)**
Press to engage the Realtime Go-To mode. (See page 61.)

(19) **Intro button (TITELBILD)**
Press to engage the Intro Search mode. (See page 60.)

(20) **Edit mode button (SCHNITT-BETRIEB)**
Press to engage the Duet Editing mode between two decks. (See page 66.)

(21) **Stand-by button (SCHNITT-BEREIT)**
Press in the Duet Editing mode to engage the player deck in the Still mode and the recorder deck in the Record-Pause mode. (See page 66.)

(22) **AUDIO MONITOR button**
Functions same as ㉒ .

(23) **Start button (SCHNITT-START)**
Press in the Duet Editing mode to start editing between the two decks. (See page 66.)

(24) **Teletext buttons**
For teletext operation. (See page 72.)

(25) **Variable search buttons (<< / >>)**
Press either button to search for a specific segment of the programme at variable speeds. (For details, see page 56.)

(26) **II (Pause/Still) button**

(27) **► /X2 (Play/X2) button**

(28) **◄◄ / ►► (Rewind) (Fast-Forward) (Shuttle Search) buttons**

(29) **● (Record) button**
Press together with the ► /X2 button ㉗ to start recording.

(30) **■ (Stop) button**

(31) **SP/LP button**
Functions same as ㉛ .

(32) **Cassette eject button (CASSETTE)**
Functions same as ❶ .

(33) **Video operate button (BETRIEB VIDEO)**
Press to turn the recorder power ON or OFF.
Keep this button pressed for 2 seconds when turning the power off to engage the Child Lock mode. (See page 53.)

(34) **TV programme buttons (TV PR.)**
Press either button to scan to a desired channel.

TV Operation buttons (designated TV models only)

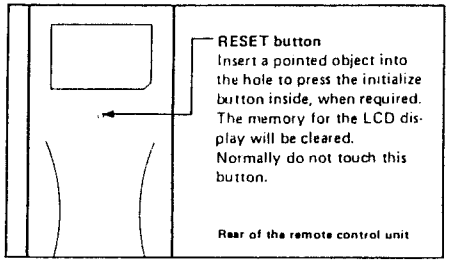
(35) **MONITOR (TV/VIDEO) button**
Press to select the TV's operating mode.
TV: For viewing broadcast programmes or tape programmes via HF-AUSGANG connection.
VIDEO: For viewing programmes via the AV connection.

(36) **TV operate button (BETRIEB (TV))**
Press to turn the TV power on or off.

(37) **TV channel buttons (KANAL)**
Press to select a desired channel on the TV receiver.

(38) **TV volume buttons (LAUTSTÄRKE)**
Press to decrease or increase the TV's sound volume.

Remote Control Unit's RESET button


RESET button
Insert a pointed object into the hole to press the initialize button inside, when required. The memory for the LCD display will be cleared.
Normally do not touch this button.
Rear of the remote control unit

Note:
When the optional VPT (VPV) adapter is connected, all buttons located on the cover of the upper portion of the remote control unit function for teletext operation when the cover is closed. Also four coloured keys and several buttons located on the lower portion of the remote control have additional teletext functions, as indicated by their additional labels.

Remote Control Unit

A/B mode switching

When you own two JVC video decks, this remote control can operate both decks separately; they do not respond simultaneously to the remote control's signal, if they are set to respond to different codes. Initially this recorder is set in the "A" mode.

To change the mode, carefully follow the instructions below:

(1) Unplug the power cord of the recorder from the AC outlet.
(2) Press the A/B-CODE select button to engage the "B" mode; "B-CODE" will appear on the LCD.
(3) Plug the power cord of the recorder into the AC outlet.
(4) Turn on the power of the recorder using the remote control's BETRIEB (VIDEO) button.

The recorder "memorizes" this B code and will respond only to the B code signals. Set the other deck to respond to the A code signals in the same procedure.

Note:

Do not operate other remote controls after you have plugged the recorder into the AC outlet and before you press the BETRIEB (VIDEO) button of this remote control.

CAUTION:

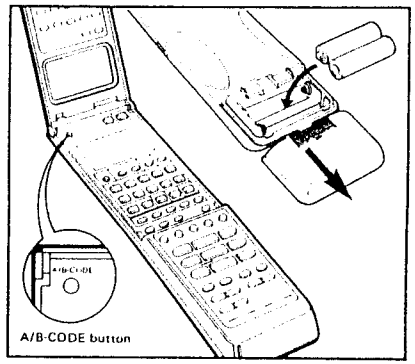
Some televisions may malfunction in response to this remote control when used in the "B" mode. If this should happen, switch the mode back to "A".

Operating distance for remote control unit

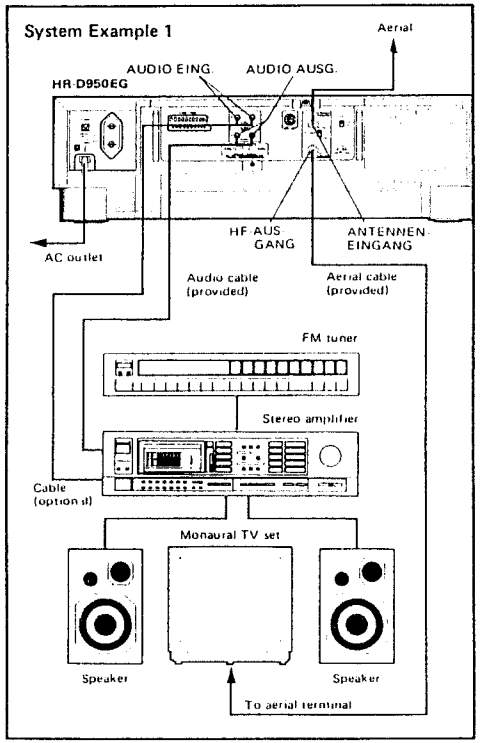
- The maximum operating distance is about 8 m.

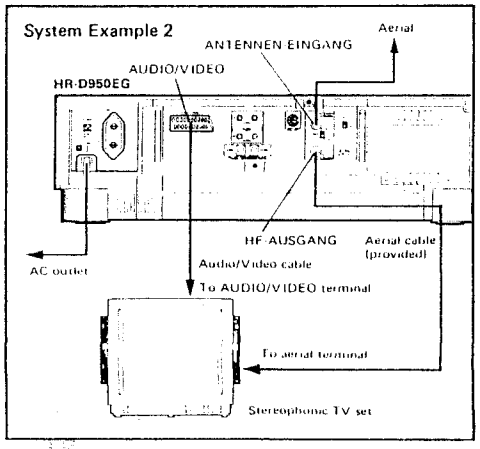
Installing the batteries

- Insert two "R6"-size batteries (provided) into the battery compartment on the rear of the remote control unit, observing correct polarity.



CONNECTIONS





Procedure

1. Remove the aerial cable from the TV receiver and reconnect to the recorder.
2. Connect the recorder to the TV receiver using the aerial cable (provided).
3. Connect the AUDIO EING. L and R ⑲ connectors of the recorder to the recording output terminals of the amplifier. (Exactly as one hooks up an audio cassette deck.)
4. Connect the AUDIO AUSG. L and R ⑱ connectors of the recorder to the AUX IN or TAPE MONITOR terminals of the amplifier.

Notes:

- Observe L and R when connecting the audio input and output connectors of the recorder to a stereo amplifier.
- If stereo or bilingual TV broadcasts are receivable in your area, this recorder can record them independently of the TV set and play them back through the connected audio system.
- When listening to sound from the connected stereo system, turn down completely the sound volume of the TV receiver.
- Listening to stereophonic sound is also possible using stereo headphones connected to the front panel KOPFHORER jack ⑫ .
- With this setup, you can enjoy prerecorded Hi-Fi VHS video tapes in hi-fi stereo while viewing them on a regular TV receiver, and also you can record FM simulcast television programmes with hi-fi audio accompaniment. See page 58.
- If you want to timer control the recording of FM simulcast programmes, connect the tuner's power cord to the recorder's AC outlet. Set the NETZAUSGANG switch ⑮ to EIN, and both the tuner and the recorder will be switched on at a time preprogrammed by the recorder. Timer-controlled recording of FM simulcast programmes is not possible with the type of tuners which reset the channel each time the power is switched off.

For customers who own a stereo TV equipped with a standardised audio/video socket

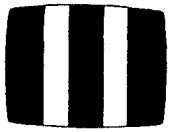
By connecting the 21-pin AUDIO/VIDEO socket ⑱ of the recorder to your TV's audio/video socket, it is possible to play stereo tapes through the TV's speakers. In this case, use the A/V mode specified on your TV, instead of UHF channel 36.

CAUTION

- This recorder has a dynamic range of more than 90 dB with regards to its hi-fi audio capability. It is recommended that you check the maximum level if you are going to listen to the hi-fi audio signals through a stereo amplifier. A sudden surge in speaker input may cause speaker damage.
- Some speakers and televisions are specially shielded to prevent television interference. If both are of the non-shielded type, do not place the speakers adjacent to the TV set, otherwise the video playback picture will not be normal because of mutual interference.

VIDEO CHANNEL SETTING

1. Press the BETRIEB button ❷ to turn the power on. Turn on the TV receiver.
2. Set the TEST switch ㉘ to EIN
3. Adjust your TV receiver in the vicinity of UHF channel 36 until you bring in the two white signal bars on the screen as illustrated. This is your VIDEO CHANNEL.
4. Reset the TEST switch to AUS.



Notes:

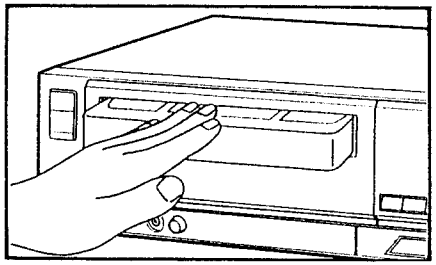
- If some interference noise is seen on the screen because of broadcasts on neighbouring channels or if your preset broadcasts should be affected in picture quality, it is necessary to shift the RF converter output frequency from that of channel 36. Consult your JVC dealer for making this adjustment.
- Video channel setting is also possible using a prerecorded VHS video cassette. Play back the tape and tune the TV receiver to obtain clear pictures and sound while monitoring the playback picture on the TV screen.
- If your TV receiver is not provided with an AFC circuit, perform fine tuning of the TV receiver when you are actually viewing video cassettes.

LOADING AND UNLOADING A CASSETTE

Loading

Insert a cassette as illustrated. Be sure to insert it firmly into the slot; otherwise, it will be automatically ejected.

- The automatic loading mechanism will operate only when the cassette in inserted correctly.
- With a cassette inserted, the "cassette loaded" indicator will appear on the FDP.



Unloading

Press the CASSETTE button ❶.

AUTO POWER-ON AND AUTO PLAY SYSTEM

- The cassette can be loaded even when the power has not been turned on. Inserting a cassette into the loading slot turns the power on automatically.
- Inserting a cassette, with its safety tab removed, turns the recorder on and playback of the cassette begins automatically.

POWER-OFF EJECT SYSTEM

- The cassette can be unloaded even after the power has been turned off. Pressing the CASSETTE button turns the power on automatically and, after ejection of the cassette, shuts it off automatically.

CAUTION

- If unloading of the cassette is not possible, check to see whether the TIMER indicator is lit. If so, press the SCHALTUHR button so the TIMER indicator extinguishes.
- Do not attempt to pull out the cassette once automatic loading has started.

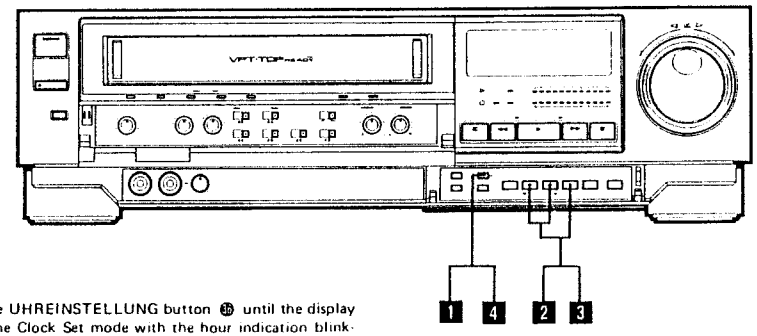
WARNING

- Do not insert fingers or any foreign object beyond the door of the cassette loading slot, as this could lead to injury or damage to the mechanism. Show special caution with children.

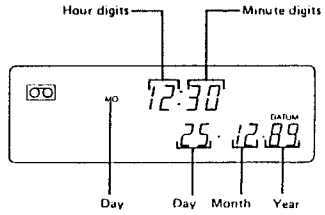
CLOCK SETTING

Setting the built-in clock

Plug the recorder into an AC outlet. The display shows a blinking 0:00.



1. Press the UHREINSTELLUNG button ⑯ until the display shows the Clock Set mode with the hour indication blinking.
2. Set the hour and minute in that order by using the AUSWAHL and EINSTELLUNG buttons ⑰ ⑱ alternately.
   - The blinking position is ready for entry.
   - Press EINSTELLUNG until the correct indication appears in each position.
3. Set the day, month and year in the same way.
   - In year setting, set only the last two digits of the year.
4. Press UHREINSTELLUNG.
   - Press it at the exact instant of the time signal, and the clock will be set accurately to the present time.
   - The day-of-the-week indication will be displayed automatically.



Notes:

- Clock setting is not possible in the timer recording standby mode. First check to see that the TIMER indicator on the FDP is not lit.
- Enter the day within 10 seconds after pressing the UHREINSTELLUNG button.

SUMMER TIME ADJUST

This convenient feature is for quickly making the annual clock adjustment to the "summer time" (daylight saving time) setting, and back to regular time later.

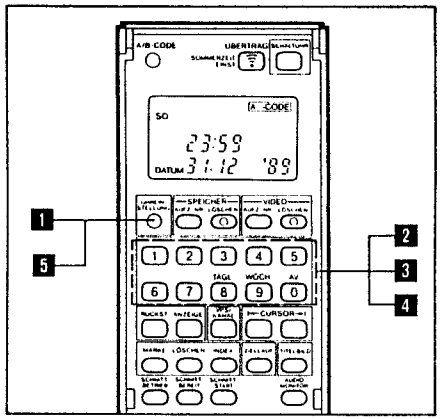
1. Simply press and quickly release the SOMMERZEIT EINST. button ⑯ to set the clock forward by one hour.
2. Later in the year, to switch back to regular time, simply hold the SOMMERZEIT EINST. button pressed for 2 seconds to set the clock back by an hour.

Power failure indicator

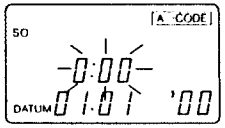
The blinking 0:00 (initial condition of the display) is also a power failure indicator, showing that there has been a power failure exceeding 3 minutes. Readjusting the time restores the normal condition of the clock display.

Setting the LCD clock of the remote control unit

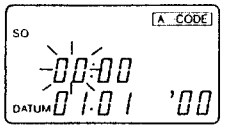
The LCD clock is independent of the recorder's clock.



Insert 2 "R6"-size batteries (provided) into the remote control. The LCD shows the following with "0:00" blinking.

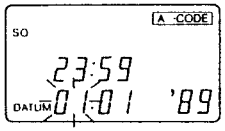


1 Press the UHREINSTELLUNG button.
- The hour indication will blink.

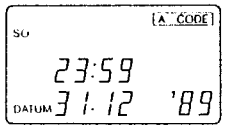


2 Press the numeric keys corresponding to the current hour, then the minute indication will blink.
- Always key in two digits.
  For a one-digit number, key in "0" first.

3 Key in the digits corresponding to the current minute, then the day position of the DATE indication will blink.



4 Key in the digits for the day, month and year in succession.
- In year setting, set only the last two digits of the year.



5 Press the UHREINSTELLUNG button at the exact instant of the time signal.
- The day-of-the-week indication will be displayed automatically.
- The clock of the remote control will be set accurately to the second.
- To readjust the clock, press the UHREINSTELLUNG button and then press either CURSOR ⊢ / ⊣ button so that the position which requires correction blinks.

SUMMER TIME ADJUST

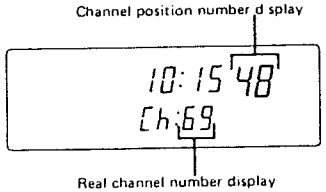
For quickly making the annual clock adjustment to the "summer time" (daylight saving time) setting, and back to regular time later, use the SOMMERZEIT EINST. button (2).

1. Simply press and quickly release the SOMMERZEIT EINST. button in the Clock mode to set the clock forward by one hour.
2. Later in the year, to switch back to regular time, simply hold the SOMMERZEIT EINST. button pressed for more than 2 seconds to set the clock back by an hour.

Note:
- For summer time adjustment, make sure that the transfer-ready mark is not on the LCD.

OPERATING THE BUILT-IN TUNER

This recorder incorporates an advanced frequency synthesized tuner which is pretuned to 91 channels to cover VHF, UHF and CATV broadcasts. Channel indication is given in two different ways: real channel numbers and channel position numbers. Real channel number indication is available by pressing the KANAL-EINSTELLUNG button (31) or VPS/KANAL button (13), or during search by pressing the SUCHLAUF button (37), while channel position number indication is always available in the channel display.



Correspondence between 91 pretuned TV stations and the recorder's real channel indications

Display	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
VHF	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11 (H1)	E12 (H2)	A	B	C	D	E	F	G	H
Display	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
UHF	E21	E22	E23	E24	E25	E26	E27	E28	E29	E30	E31	E32	E33	E34	E35	E36	E37	E38	E39
Display	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58
UHF	E40	E41	E42	E43	E44	E45	E46	E47	E48	E49	E50	E51	E52	E53	E54	E55	E56	E57	E58
Display	59	60	61	62	63	64	65	66	67	68	69								
UHF	E59	E60	E61	E62	E63	E64	E65	E66	E67	E68	E69								
Display	75	76	77	78	79		81	82	83	84	85	86	87	88	89	90	91	92	93
CATV	X	Y	Z	–	–		S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13
Display	94	95	96	97	98	99	00												
CATV	S14	S15	S16	S17	S18	S19	S20												

Stored channels

A total of 91 channels are receivable. Of them, up to 48 can be stored for easy channel selection. Prior to shipment, some channels are stored.
It is possible to store more channels or skip some channels if there are no broadcasts on those channels in your area. It is possible to change the stored channels to correspond to your preferred channel allocation. Skipped channels can be restored whenever necessary.
- Channel memories are permanent; the programmed channel allocation will not be erased even if the recorder is unplugged from the AC outlet.

Channel selection

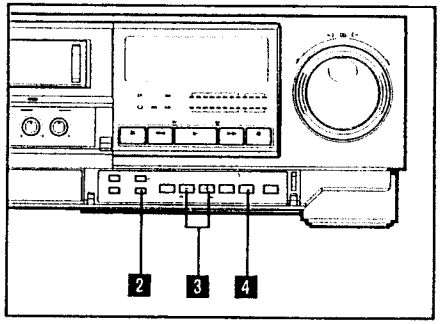
To select a channel for recording, normally use the TV PR. (-/+) buttons (33) (34 on the remote control) or 10 numeric keys (10). You can choose any channel from among the stored ones by calling up the corresponding channel position number.
- Use the "-" button to scan to a channel in the direction of decreasing numbers; the "+" button, in the direction of increasing numbers.
- An invalid number larger than 48 will be rejected.

If you want to select a channel other than those stored, engage the Real Channel mode and call up a channel, while referring to the real channel number display.
With recorder's controls:
- Simply press the SUCHLAUF button (37).

With remote control:
- Press the VPS/KANAL button (13) to engage the Real Channel mode and call up a channel by using the 10 numeric keys. For details, refer to the next page.

Storing channels

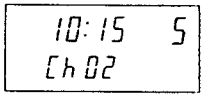
Turn the TV receiver to ON and adjust it to your video channel.



A. Automatic setting

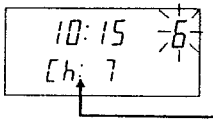
1 Turn the power on.
- The display will change from the Date mode to the Counter mode.

2 Press the SUCHLAUF button ⑰ .
- The display will change to the Real Channel mode and automatic scanning will take place.
- Reverse search will be engaged if the SUCHLAUF button is kept depressed.



VHF channel 2 is stored for channel position 5.

- When a broadcast is detected, scanning stops automatically and the displayed channel position number will blink.



"Colon" will appear to indicate that this real channel is not stored for the indicated channel position.

3 Select a channel position into which you wish to store that station by using the TV PR. (-/+) buttons ⑮ while the channel position number is blinking.

4 After confirming the real channel number and channel position number, press the SPEICHERN button ⑪ .
- The channel position number stops blinking.
- "Colon" will disappear and the selected station has been stored.

B. Manual Setting from remote control unit

(1) Press the VPS/KANAL button ⑬ .
- The display will change to the Real Channel mode.

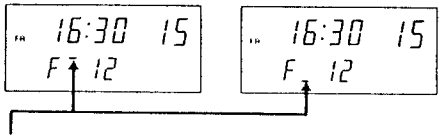
(2) Press VPS/KANAL until the real channel number starts blinking.
- Blinking will stop in 10 seconds.

(3) Enter the number of a real channel to be preset.
- The channel position number will start blinking.

(4) Select a channel position into which the selected real channel is to be stored, using the 10-digit keypad.
- Depress the numeric key for the second digit continuously until blinking stops. This enables the entered number to be stored.
- The display will return to the clock mode by simply keying in the channel number to be viewed.

•Fine Tuning

For fine tuning, press the AUSWAHL button ⑩ in step 3 (both in automatic and manual setting) and use the FEIN "+" or "-" button ⑭ ; "+" to fine-tune in the direction of increasing frequencies, and "-" to fine-tune in the direction of decreasing frequencies.



Upper or lower "-" sign indicates the operating tuning frequency is above or below the standard broadcast frequency.
Centre "-" sign will appear when it corresponds to the standard.

Skipping the stored channels

1. Call up the channel position number that you wish to skip by using the TV programme (-/+) buttons or 10 numeric keys.
2. Press the KANAL-EINSTELLUNG button ⑭ .
3. Press the SPRINGEN button ⑮ .
   - "Colon" will appear to indicate that the displayed real channel is not stored.
   - The skipped channel number will not appear on the channel display during up/down scan tuning.

Note:

If no command is given after each step of the setting operation, the Real Channel mode will be automatically cancelled in 10 seconds.

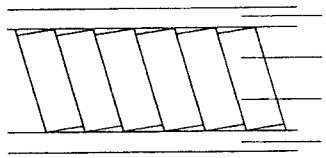
INFORMATION ON THE HR-D950EG'S AUDIO SYSTEM

Hi-Fi and normal audio

To provide true hi-fi audio accompaniment to video entertainment and, at the same time, compatibility with regular VHS tapes, this recorder employs a unique audio recording system. Hi-fi audio signals (2-channel) are recorded deep into the tape's magnetic coating, and the video signal is recorded on top of the audio signals in a shallower layer. At the same time, another audio head records normal audio signals (monaural) onto the usual longitudinal audio track. Since this longitudinal audio track is exactly the same as on regular VHS tapes, tapes recorded on the recorder can be played back on other VHS machines, and vice versa. Also, this longitudinal track can be replaced later with new recordings through audio dubbing.

CAUTION:
The hi-fi soundtrack recorded with the recorder cannot be reproduced with video equipment other than Hi Fi VHS.

Tape pattern recorded with this recorder



Hi-fi audio recording and reproduction are available only from the hi-fi audio track while the longitudinal audio track provides normal audio.

The hi-fi and normal soundtracks are recorded simultaneously, and audio dubbing is applicable only to the normal audio.

Recording options according to the selected input mode

Input mode \ Track	Video track	Normal audio track (mono)	Hi-fi audio track (2-channel)
TUNER (button pressed to OFF)	TV picture (from built-in tuner)	TV sound (from built-in tuner)	TV sound (from built-in tuner)
SIMUL (button pressed to ON)	TV picture (from built-in tuner)	TV sound (from built-in tuner)	Audio signal from AUDIO EING.
AUX (Channel display section: AU)	Video signal from AUDIO/VIDEO	Audio signal from AUDIO/VIDEO (Mixing with microphone input is possible.)	

Notes:
- To engage the AUX mode, press the "0" key of the 10-digit keypad.
- Microphone input will be mixed with the audio signals on the hi-fi audio track only when the AUX mode is selected.
- You can record audio only (without recording any video signal) in either the SP or LP mode. In the LP mode you can enjoy up to 8 hours of hi-fi stereo recordings with a single cassette (E-240).

Recording options according to the type of broadcasts and the setting of the 2-KANAL-TON HAUPT/NEBEN switch

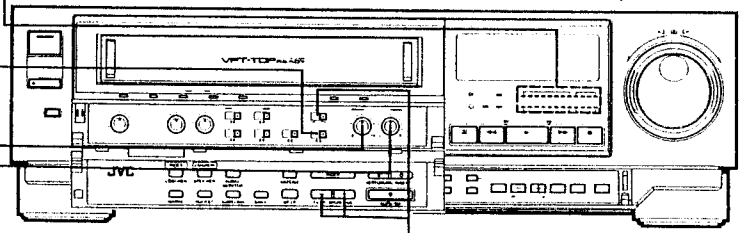
Type of broadcast \ 2-KANAL-TON HAUPT/NEBEN switch \ Audio Track		Normal audio track (mono)	Hi-fi audio track (2-channel)	
			L	R
Regular (monaural audio)	Either position	Mono	Mono	Mono
Stereo broadcast	Either position	L + R mixed	Stereo	
Bilingual broadcast	HAUPT	Main soundtrack (local language)	Main soundtrack (local language)	Sub soundtrack (foreign language)
	NEBEN	Sub soundtrack (foreign language)		

Hi-Fi audio recording level adjustment

While recording onto the normal audio track is controlled by the built-in Automatic Level Control circuit, hi-fi audio recording has two control options: manual and automatic.

AUDIO-BEGRENZER switch
Setting this switch to EIN activates the built-in audio limiter circuit for both channels so that the recording level is automatically controlled. For manual adjustment, set this switch to AUS. (The recording level for normal audio is always controlled automatically regardless of the setting of this switch.)

Audio level indicators
For manual control of the recording level, first set the relevant switch and button as follows:
AUDIO-BEGRENZER ㉘ → AUS
PEGELANZEIGE ㉙ → EIN
AUDIO MONITOR ㉗ → Hi-Fi L and R (Hi-Fi Stereo)
Then slide the Hi-Fi AUFN. PEGEL control knob referring to these indicators. When indicators up to or near 0 dB light for the loudest signal being applied, the recording level is optimum. (The level at which only one red indicator lights from time to time may be most appropriate.)
During playback, these indicators show the level of audio signals recorded on the tape.
Notes:
- With the AUDIO MONITOR and AUDIO-MIX buttons pressed so either Hi-Fi L or R or NORMAL indicator lights, the recording level of hi-fi audio signals cannot be correctly indicated. Select both Hi-Fi L and R indicators when adjusting the recording level.
- The normal audio signal level is also displayed by these indicators, but cannot be adjusted.



Hi-Fi AUFN. BALANCE control knob
Turn this control knob to adjjust the balance between L and R channels relative to each other, while adjusting the hi-fi audio recording level: counterclockwise to boost the hi-fi audio left-channel recording level, clockwise to boost the right-channel.

Hi-Fi AUFN. PEGEL control knob
Turn this control knob, clockwise to increase the recording level and counterclockwise to decrease the recording level, for manual adjustment of the hi-fi audio recording level.

PEGELANZEIGE switch and SPURLAGE buttons
The right-channel audio level indicator also functions as a tracking meter during playback. If noise or breaks are sensed in the reproduced sound from the hi-fi audio track or noise bars are visible on the screen, perform manual tracking adjustment using the SPURLAGE buttons (see page 54) while referring to the meter. For this purpose, set this switch to Hi-Fi SPURLAGE and press the buttons so that the greatest number of elements of the right-channel indicator light. When this switch is set to AUS, the indicators do not light, regardless of whether during recording or playback.
Note:
When playing back a tape with no recording on the hi-fi audio track, the level indicator does not light when the PEGELANZEIGE switch is set to Hi-Fi SPURLAGE.

Dual-audio playback flexibility

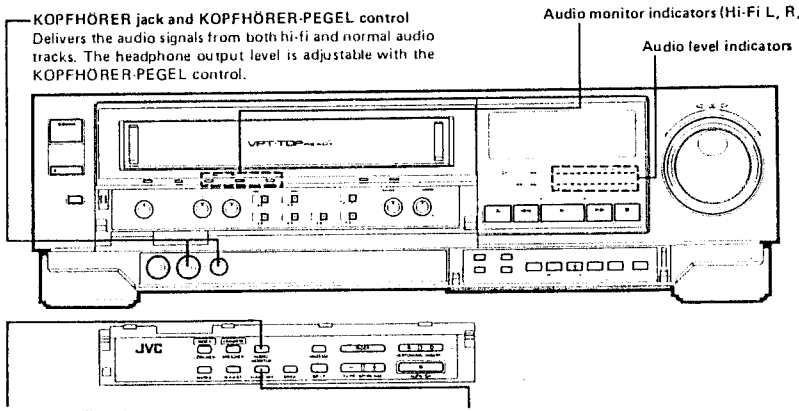
Two different types of audio tracks (hi-fi and normal) allow a variety of playback options depending on the connection and the settings of relevant controls and switches.

Relevant audio signal output connectors:

1. **HF-AUSGANG connector ㊲**
Delivers audio (both hi-fi and normal) and video signals to a TV receiver. When the recorder is not used, the aerial signal is supplied from this connector to the TV receiver to allow regular TV viewing; when a video tape is played back through the HF-AUSGANG connector, the audio is reproduced always as monaural; with hi-fi stereo tapes, both channels are mixed or the one selected by the AUDIO MONITOR and AUDIO-MIX buttons is reproduced. Therefore, for stereo playback, connect a stereo system to the AUDIO AUSG. connectors or a stereo television to the AUDIO/VIDEO socket. Refer to page 45.
2. **AUDIO AUSG. connectors ㊱**
Delivers the audio signals from both hi-fi and normal audio tracks.
3. **AUDIO/VIDEO socket ㊴**
Delivers audio (both hi-fi and normal) and video signals. (Also accepts audio and video signals for recording from other video equipment.)

Corresponding buttons to select audio channels for listening

KOPFHÖRER jack and KOPFHÖRER-PEGEL control
Delivers the audio signals from both hi-fi and normal audio tracks. The headphone output level is adjustable with the KOPFHÖRER-PEGEL control.



AUDIO MONITOR button
Selects the hi-fi audio channel (left, right or both) for listening. Use this button together with the AUDIO-MIX button referring to the three indicators (Hi-Fi L, R and NORMAL).
- When the power is turned on, the Hi-Fi L and R indicators light and both hi-fi stereo soundtracks can be listened to. Press this button and only the Hi-Fi L indicator lights to listen to only the left hi-fi channel sound.
- Press this button again and only the Hi-Fi R indicator lights to listen to only the right hi-fi channel sound.

Notes:
- With the AUDIO-MIX button pressed for the NORMAL setting, pressing the AUDIO MONITOR button has no effect.
- This button functions during recording as well, although it has no effect on the recorded signal.

AUDIO-MIX button
Operates in conjunction with the AUDIO MONITOR button to select sound tracks for listening.
- When the power is turned on, both hi-fi stereo soundtracks can be listened to. Press this button once to listen to only the normal soundtrack (the NORMAL indicator lights). Press this button again to listen to a mixture of hi-fi stereo (Hi-Fi, L and/or R), and normal soundtracks, by selecting the combination with the AUDIO MONITOR button.

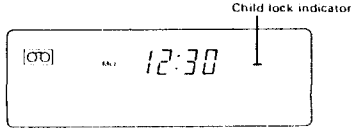
Notes:
- This button functions during recording as well, although it has no effect on the recorded signal.
- When playing back a tape containing the same soundtrack on both hi-fi and normal audio tracks, a slight time lag is sensed between the two soundtracks, probably with some distortion when listening in the Mix mode.

CHILD LOCK FUNCTION

The Child Lock function is for preventing accidental operation by young children, or other unwanted operation, such as playing back or recording over an important cassette you may have intentionally left inserted in the recorder. By engaging the Child Lock mode, the operation buttons on the recorder become ineffective, unless the remote control is used.

To engage the Child Lock mode

- Press the remote control's BETRIEB (VIDEO) button ㉝ to turn the recorder power off and keep this button pressed for about 2 seconds after the power LED indicator has gone off.
- The Child Lock indicator (–) will appear in the channel display section on the FDP to show that the recorder is now in the Chi'd Lock mode.



To disengage the Child Lock mode

- When the remote control's BETRIEB (VIDEO) button is pressed to turn the recorder power on, this disengages the Child Lock mode. The recorder will turn on and the corresponding display will appear with the channel number appearing where the child lock indicator appeared before.
- Pressing the SCHALTUHR button during timer recording also disengages the Child Lock mode.

Notes:
- While in the Child Lock mode, the recorder can receive timer programmed data from the remote control.
- Timer recording is possible also, even while in the Child Lock mode. After timer recording has been performed, the Child Lock mode remains in effect.
- Even after automatic cassette ejection at tape end, following timer recording, the Child Lock mode remains in effect.
- It is possible to insert a cassette while in the Child Lock mode. After inserting a cassette, the Child Lock mode remains in effect.

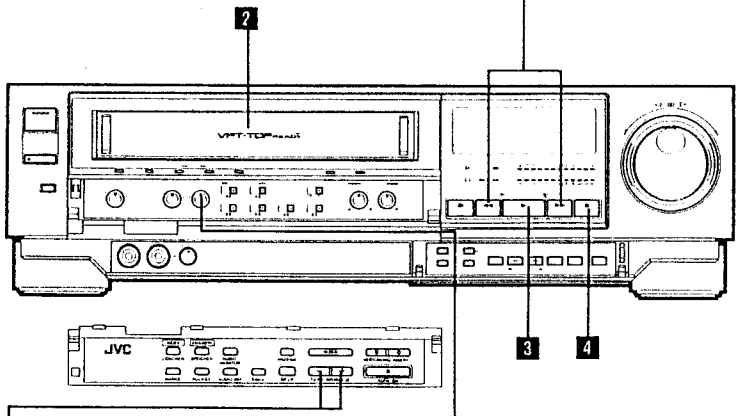
PLAYING BACK A VIDEO CASSETTE

1. Turn the TV receiver on and adjust it to your video channel.
2. Load a pre-recorded cassette.
   - Power will be switched on automatically.
   - When the cassette loaded has no safety tab, playback will start automatically.
3. Press the WIEDERG. /X2 button ㉘.
4. Press the CASSETTE button ⑩ at the end of the programme.
   - The tape will be rewound automatically when its end is reached and the recorder will enter the Stop mode.

SHUTTLE SEARCH

Shuttle Search allows high-speed playback at 9 times normal speed in either direction.

1. Press either RÜCKLAUF or VORLAUF Shuttle Search button ㉗ during playback.
2. To cancel the Search mode, press the WIEDERG./X2 button.
   - For briefer scanning, keep the Shuttle Search button pressed for more than 2 seconds; when you release the button, the Search mode will be cancelled.



DIGITAL AV TRACKING SYSTEM

This recorder incorporates a digital AV tracking system for automatic tracking adjustment. In most cases you do not have to adjust tracking.

- When you start playback after inserting a tape, the digital tracking system automatically adjusts the tape path relative to the heads to obtain the best possible pictures and Hi-Fi stereo sound.
- If there is no recorded Hi-Fi audio, tracking is set referring only to the video signal. The audio output is automatically switched to normal audio.
- This automatic adjustment also takes place when the playback output level reduces below a certain level.
- The DIGITAL-AV-SPURLAGE indicator ⑨ blinks while the system is searching for optimum tracking, and remains lit as long as the automatic tracking mode continues.

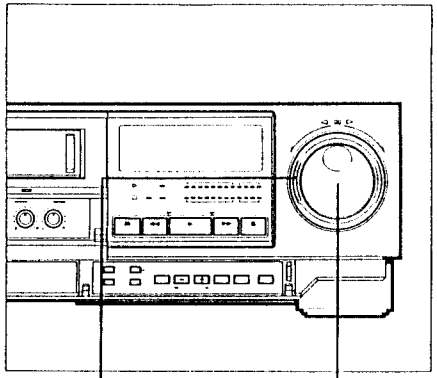
If automatic tracking fails, and some noise bars are visible on the screen, use the manual tracking mode.

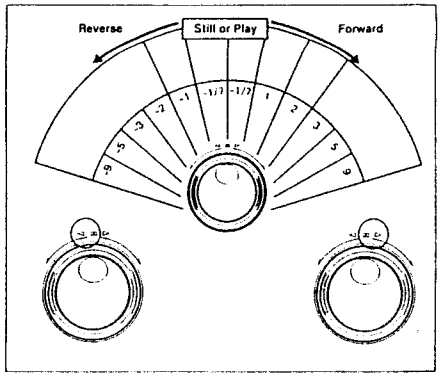
- Press the SPURLAGE "+/-" buttons ⑮ simultaneously to cancel the automatic mode, then press either button to move noise bars off the screen.
- To return to the automatic mode, press both buttons simultaneously.

Picture Sharpness Adjustment

Images on the screen can be adjusted to a preferred softer or sharper definition by turning the BILDSCHARFE control ⑰ in the corresponding direction.

SPECIAL-EFFECTS PLAYBACK





VARIABLE-SPEED SEARCH

SHUTTLE ring

By turning the SHUTTLE ring clockwise or counterclockwise, variable-speed search is possible in either the forward or reverse direction from either the Play or Still mode.

- To search in the forward direction, turn the SHUTTLE ring gradually clockwise. The farther the dial is rotated, the faster the search speed becomes – from 1/7 to 9 times normal in the SP and LP modes.
- To search in the reverse direction, turn the SHUTTLE ring gradually counterclockwise. The farther the dial is rotated, the faster the search speed becomes – from -1/7 to -9 times normal in the SP and LP modes.
- Releasing the SHUTTLE ring produces a still picture on the screen.
- The direction indicators (◁/▷) show in which direction the tape is moving.

FRAME-BY-FRAME PLAYBACK

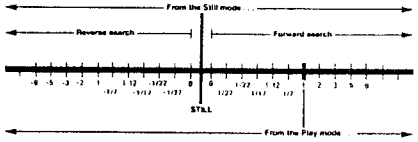
JOG dial

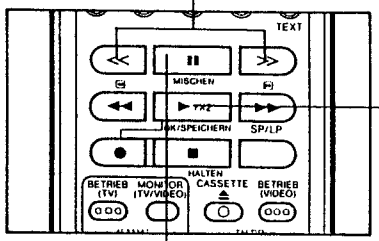
- While in the Still mode, the tape can be advanced or moved back a frame at a time for precise location of a specific point in a scene. (This function is especially convenient for locating edit-in and edit-out points during editing.)
- Turn the JOG dial clockwise while in the Still mode to advance the picture; counterclockwise to move the picture back.
- Each 60-degree turn of the JOG dial in either direction, moves the picture forward or back by one frame.
- If the JOG dial is rotated at a speed of about one revolution per second, the picture moves at about 1/7 normal speed. If rotated at about two revolutions per second, the picture moves at about normal speed playback.

Variable search (≪ and ≫)
Variable speed search is possible in either forward or reverse direction from either the Still or Play mode.

- To search in the forward direction:
  - Press the ≫ button in the Play mode to start fast-motion searching from 2 times normal speed. To increase speed (to 3, 5, 9 times normal), press ≫ repeatedly.
  - Press the ≫ button in the Still mode to start slow-motion searching from 1/27 normal speed. To increase speed (to 1/22, 1/17, 1/12, 1/7, normal, X2, X3, X5, X9), press ≫ repeatedly. To decrease speed, press ≪ repeatedly. (Pressing the ≪ button in the Play mode, starts slow-motion searching at 1/7 normal speed.)
- To search in the reverse direction:
  - Press the ≪ button in the Still mode to start slow-motion searching in the reverse direciton at -1/27 normal speed playback. To increase speed (to -1/22, -1/17, -1/12, -1/7, -1, -2, -3, -5, -9 times normal), press ≪ repeatedly. To decrease speed, press ≫ repeatedly.
- To return to the normal Play mode, press the ► /X2 button.

Note:
- Vertical vibration of the picture may be observed during double-speed or slow-motion playback. Press the PAUSE/STANDB. button to obtain a still picture and then correct it by using the V-BILDFANG control ⑯ .





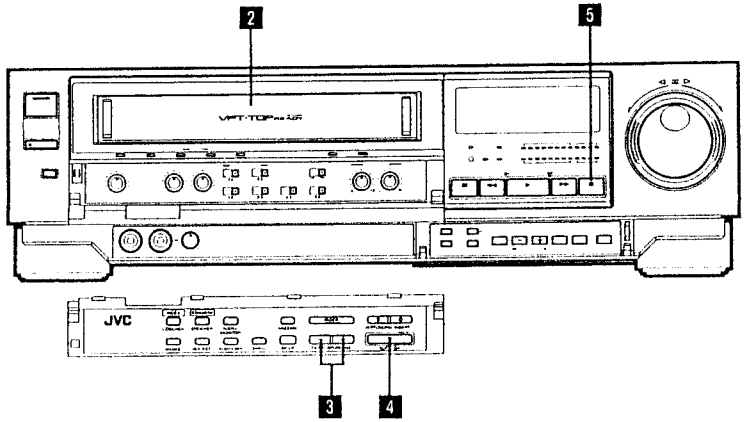
DOUBLE-SPEED PLAYBACK
- Press ►/X2 while in the Play mode; double-speed playback will be engaged.
- To resume normal playback, press the same button again.

STILL PICTURE
1. Press ▮▮ during playback.
2. To advance the still picture, press ▮▮ a number of times.
3. To cancel the Still mode, press ► /X2.

Notes:
- When the Still mode continues for longer than about 5 minutes, the Stop mode will be entered automatically.
- With some televisions, the still picture may be unstable. This is not due to any defect of the unit. If vertical vibration of the picture is observed, attempt to correct it by using the V-BILDFANG control ⑯ .

Notes:
- No audio is available during any Special-effects Playback mode.
- If noise bars are visible while in a Special-Effects Playback mode, first press the WIEDERG./x2 button to engage the normal Play mode; then press the SPURLAGE -/+ buttons simultaneously to cancel the Automatic Tracking mode. Next, press the corresponding button to return to the previous Special-Effects Playback mode, and then perform the manual tracking adjustment as described on page 54.
- Some noise may be observed in the Special-Effects Playback mode. This is not due to any defect of the unit.

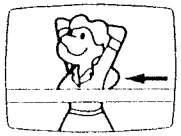
BASIC OPERATION FOR RECORDING TV PROGRAMMES



1 Turn the TV receiver on and adjust it to your video channel.
2 Load a cassette (with safety tab in place).
- Power will be switched on automatically.

3 Press either TV PR. button ㉘ to select the channel you wish to record.
4 Press the AUFN./DA button ㉕ to start recording.
- Be careful to press AUFN./DA only once, or Instant Timer Recording will begin.
- Press the record ㉙ and the play ㉗ buttons simultaneously when using the remote control unit.
- If there is part of the programme you do not want to record, press the PAUSE/STANDB. button ㉗ . A white horizontal bar will appear on the screen, which reduces in size in 4 steps as time elapses. When the last quarter starts blinking and disappears, the Stop mode will be entered automatically. The pause duration is possible for about 5 minutes.

Pause mode indicator



- To continue recording from the Pause mode, press the WIEDERG./X2 button ㉒ while the white bar is on-screen.

5 Press the STOP button ㉚ at the end of the programme.
- When the end of the tape is reached during recording, the tape is automatically rewound and stops.

Notes:
- When recording is restarted from the Pause mode, assemble recording is performed so that the playback picture will not distort at the edit point.
- The selected channel cannot be altered during recording. If you wish to change the channel, first engage the Pause mode and then select a different channel.

INSTANT RECORDING
If you wish for recording to stop automatically after a certain period of time, use this Instant Timer Recording mode.
1. Press the AUFN./DA button during recording (or twice if in the Stop mode).
   - Recording will begin and the FDP shows "AUT 0:30", indicating that recording will automatically stop and power will switch off after 30 minutes.
2. Adjust the switch-off time, if necessary.
   - Press AUFN./DA to increase the time in 30-minute increments (possible up to 4 hours).
   - Use EINSTELLUNG and AUSWAHL to set to a more precise time when required (possible up to 8 hours 59 minutes). After setting the time, press AUSWAHL so that all digits stop blinking.

RECORDING ONE PROGRAMME WHILE WATCHING ANOTHER
A programme not being viewed can be recorded while you enjoy another programme.
- Select the channel you wish to record with the recorder's channel select buttons.
- Select the channel you wish to view with the TV receiver's channel selector.

RETAKE FUNCTION
While in the Record-Pause mode, pressing the VORLAUF or RÜCKLAUF button initiates normal-speed search in the corresponding direction. Releasing the button engages the Record-Pause mode. If you have recorded unnecessary material because of having engaged the Record-Pause mode too late, use this function to return to the position where you want the next recording to start. Then, simply press the WIEDERG./X2 button when you want to start recording.

OTHER RECORDING POSSIBILITIES

RECORDING STEREO TV PROGRAMMES

(Applicable only to the West German Sound Multiplex TV system)

If stereo TV programmes are broadcast in your area, this recorder automatically receives them in stereo. When a stereo programme is being received, the STEREO indicator lights and recording is made in stereo on the hi-fi audio track and in monaural (mixed L + R) on the normal audio track. To listen to the stereo soundtrack during recording, set the AUDIO MONITOR button ⑰ for Hi-Fi L and R. If this button is left set either in the Hi-Fi L or R position, you will hear only one channel while recording, though the recording is being made in stereo.

- If the quality of the stereo sound being received is poor, set the 2-KANAL-TON MONO/AUTO switch ⑱ to MONO. The STEREO indicator will go off, and the broadcast will be received in monaural with better quality.

RECORDING BILINGUAL TV PROGRAMMES

(Applicable only to the West German Sound-Multiplex TV system)

When a bilingual TV programme is being received, the 2-KANAL indicator lights. There is a switch to select the soundtrack to be recorded on the normal audio track, however, because both soundtracks are recorded always on the hi-fi track for selective listening, you can ignore the switch labelled 2-KANAL-TON HAUPT/NEBEN in most cases unless you need a specific soundtrack on the normal audio track.

- Set 2-KANAL-TON HAUPT/NEBEN switch ⑱ to HAUPT to record the main soundtrack (local language); to NEBEN to record the sub soundtrack (foreign language).
- To listen to the selected soundtrack from the hi-fi audio track while recording, press the AUDIO MONITOR button for either Hi-Fi L or R.
- To listen to the soundtrack being recorded on the normal audio track, press the AUDIO-MIX button ⑰ for NORMAL.

RECORDING FM SIMULCAST TV PROGRAMMES

FM simulcast TV programmes can be recorded using an FM stereo tuner. Connect necessary components. (Connect the FM tuner to the rear panel AUDIO EING. connectors.) Select the TV channel broadcasting the simulcast programme with the recorder's channel select buttons and tune the FM stereo tuner to the station broadcasting the soundtrack for this TV programme.

The only difference from the basic recording procedure on page 57 is an additional step after step 3.

- Press SIMUL button ⑮.

  Then the SIM indicator on the FDP will light. With this setting, the video and audio signals from the built-in tuner will be recorded on the video and normal audio track and the audio signal from the FM stereo tuner will be recorded on the hi-fi audio track.

Notes:

- After finishing recording, be sure to press the SIMUL button to switch back to the Tuner mode.
- While recording simulcast programmes, it might happen that the hi-fi sound distorts momentarily at switching points between different programmes. This is not due to any defect of the unit.

RECORDING A TV PROGRAMME WHILE RECORDING AN INDEPENDENT AUDIO SOURCE

Using the "simulcast" recording function, you can record independent audio and video programmes, because the TV soundtrack is not lost, but recorded on the normal audio track. While recording a TV programme, record any audio source independently.

- Connect an audio component (such as an FM tuner) to the AUDIO EING. connectors ⑭.
- Press SIMUL button. The SIM indicator on the FDP will light.

Notes:

- If you stop recording to avoid unwanted material of the TV programme using PAUSE/STAND8. button, the audio programme from an external source is also cut.
- If television broadcasting comes to an end during recording, the hi-fi sound being recorded from an external source may distort. It is recommended that you check the timetable of TV broadcasts in advance.
- After finishing recording, be sure to press the SIMUL button to switch back to the Tuner mode; otherwise, recording on the hi-fi audio track from the built-in tuner will not be possible.

24-HOUR INSTANT TIMER RECORDING

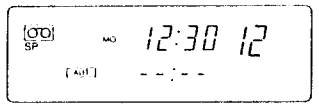
The 24-Hour Instant Timer Recording feature allows unattended automatic starting and stopping of the recording of a single programme which starts within a 24-hour period.

Preparations

1. Insert a cassette with its safety tab in place. The recorder turns on automatically.
2. Select the channel you wish to record from.

Setting the timer

1. Press the START button ⑫ to engage the 24-Hour Instant Timer Set mode. The following information, with the current time and AUT "--:--", will appear on the FDP.



   - Each pressing delays the START time by 30 minutes.
2. After reaching the desired START time, press the AUFN./DA button ⑬ the required number of times to set the desired length of recording time.
3. After confirming the START time and recording length, press the BETRIEB button ❷.
   - "AUT" remains on the FDP and the 24-Hour Instant Timer Standby mode will be automatically engaged.
   - If the programme has not been correctly preset, the "AUT" indicator will blink for about 10 seconds when the BETRIEB button is pressed. Recheck the programmed data.

For a More Precise Setting of Start Time and Recording Length

- After first pressing the START button once, press the AUSWAHL button ⑩. The hour digits for START time setting will flash.
- Set the hour with the EINSTELLUNG "+/-" buttons ⑪, then press AUSWAHL. The minute digits will flash.
- Set the minutes with the EINSTELLUNG "+/-" buttons, then press AUSWAHL. The hour digits for "AUT" setting will flash.
- Set the hour with the EINSTELLUNG "+/-" buttons, then press AUSWAHL. The minute digits will flash.
- Set the minutes with the EINSTELLUNG "+/-" buttons.

Notes:

- At each step of the timer setting procedure, if no time is entered within 10 seconds, the Instant Timer Set mode is cancelled, and the current time is displayed.
- To cancel the Instant Timer Set mode, press the LOSCHEN button ⑪ twice.
- 24-Hour Instant Timer Recording has priority over other timer programme settings; therefore, no other programmes, set for timer recording, will be recorded until 24-Hour Instant Timer Recording has been executed.

NEXT-FUNCTION MEMORY

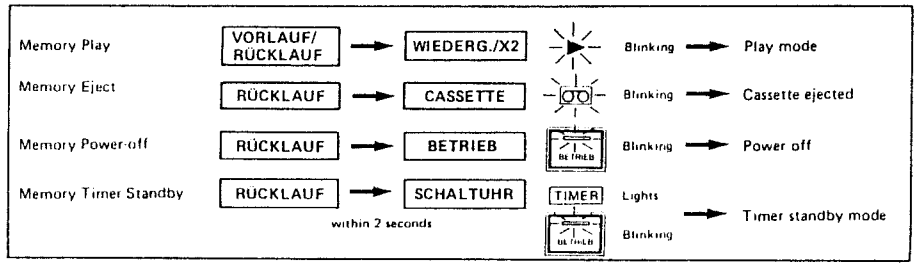
Memory Play function

- If you want to watch the tape from its beginning after rewinding, press RÜCKLAUF and then the WIEDERG./X2 button within 2 seconds. Playback will start automatically at the beginning of the tape. (Check to see that the counter memory indicator [S] is off.)
- If you want to watch the tape from the counter reading of "0St 00M 00S", press the ZAHLWERK-SPEICHER button, then the RÜCKLAUF (or VORLAUF) button and then the WIEDERG./X2 button within 2 seconds.
- While the tape is being rewound, the Play (►) indicator is blinking. To cancel the Memory Play mode and go to another mode, press the corresponding button (CASSETTE, WIDERG./X2, VORLAUF, RÜCKLAUF).

Memory Eject/Power-Off/Timer Standby

If you are going to eject the cassette, turn the power off or engage the Timer Standby mode after rewinding the tape, you do not have to wait for completion of rewind to press the corresponding button.

- To eject the cassette after rewind, press RÜCKLAUF and then CASSETTE within 2 seconds. (To cancel the Memory Eject mode, press STOP.)
- To turn the power off after rewind, press RÜCKLAUF and then the BETRIEB button within 2 seconds. (To cancel the Memory Power-off mode, press BETRIEB).
- To engage the Timer Standby mode after rewind, press RÜCKLAUF and then the SCHALTUHR button within 2 seconds. (To cancel the Memory Timer Standby mode, press SCHALTUHR).



INDEX SEARCH FUNCTION

The Index Search function gives you automatic access to locations on the tape where index codes are recorded. Index codes are recorded automatically at the beginning of recordings which are started from the Stop or Timer Standby mode, or recorded manually at any other position during recording or playback. Unnecessary codes can be erased manually during playback. In neither case is there any effect on the audio or video recordings on the tape. With this recorder, you can access any one of up to 9 of these indexed segments in either the forward or reverse direction.

Using the Index Search function

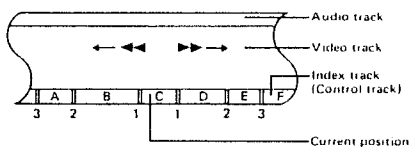
1 Press the INDEX button 15 while in the Play or Stop mode.
- The channel display of the FDP will change to the Index Search mode and the "INDX" indicator will light.

2 Specify the index number (1 – 9) using the numeric keys 10 within 10 seconds.
- The specified number will appear in the FDP.

3 Press either ◄◄ or ►► button 28 .
- The tape will move and the index numbers count down to 0, where normal playback will start.
- If the INDEX button was pressed in the Play mode, the screen will show search pictures; if the button was pressed in the Stop mode, then the index codes are detected in the much faster Rewind or Fast-Forward mode.

Notes:
- To cancel the Index Search mode before completion, press the ► /X2 27 or ■ button 30 .
- If the end of the tape is reached while still in the Index Search mode, the mode is cancelled and the tape rewound.

Tips for specifying the index number



- "1" + ►► moves playback to the beginning of segment D.
- "1" + ◄◄ moves playback to the beginning of segment C.
- "2" + ◄◄ moves playback to the beginning of segment B.
- If no number is entered, a value of "1" is assumed.

Changing the index codes

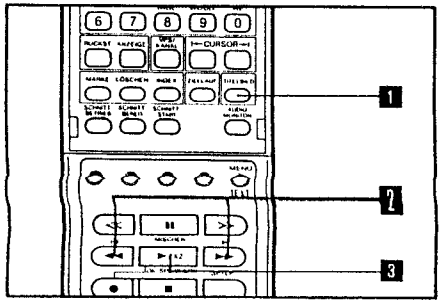
Mark button ⓲ 17 (MARKE)
In the Play or Record mode, press this button once to put an index code onto the tape. "INDX" appears on the FDP and blinks during the marking process.

Erase button ⓰ 16 (LÖSCHEN)
In the Play or Still mode, press this button to erase the next index code. The tape is automatically fast-forwarded and when an index code is detected, it will be erased automatically. "INDX" remains lit on the FDP during the searching process and blinks during the erasing process.

Notes:
- Index codes cannot be added or erased on a tape with its safety tab removed.
- The Erase mode is cancelled either after one index code has been erased or the Play mode is cancelled.

INTRO SEARCH FUNCTION

The Intro Search function lets you visually check the contents of each recording by playing back in fast motion a short segment of a programme each time an index code is detected.



1 Press the TITELBILD button 19 while in the Play or Stop mode.
- The INDX indicator on the FDP will light.

2 Press the ◄◄ or ►► button 28 within 2 seconds.
- The Intro Search will start in the corresponding direction.
- Each time an index code is detected, the corresponding part is played back in the Search mode (9 times normal) for about 5 seconds.

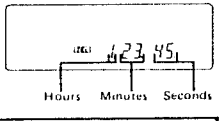
3 When you find the section you want to view, simply press the ► /X2 button 27 .
- Normal playback will start.

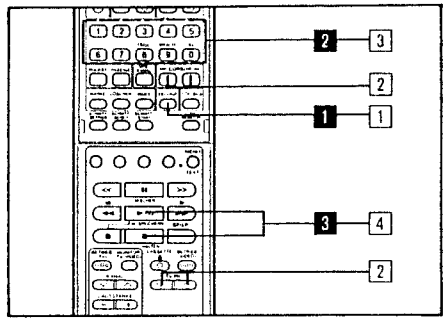
REALTIME TAPE COUNTER

Unlike usual tape counters which show tape locations in numbers, this realtime tape counter shows tape time precisely in hours, minutes and seconds in all modes (Record, Play, Rewind, Fast Forward).

Time Go-To function

The time Go-To function gives you direct access to any point on the tape by simply specifying the time from the beginning of the tape.





1 Press the ZIELLAUF button 18 while in the Play, Stop or Still mode.
- The counter will change to the Go-To mode.

2 Specify the time (from the beginning of the tape) to the point to be located, by using the numeric keys 10 .

3 Press the ► /X2 27 or ■ button 30 .
- Always key in a full number.
- Depending on the situation, search will take place either in the Shuttle Search mode or in the Rewind or Fast Forward mode which is much faster than the Shuttle Search mode. After the specified point is reached, playback starts automatically or the tape stops automatically depending on the command.

Pressing ► from Play or Still mode:	Shuttle Search – Automatic start of playback
Pressing ► from Stop mode:	Rewind or Fast-Forward – Automatic start of playback
Pressing ■ from Play, Still or Stop mode	Rewind or Fast-Forward – Automatic stop

- If the recorder did not detect the leader tape when the cassette was loaded (indicated by "St – – M – – S" when the ZIELLAUF button is pressed), the tape is first rewound to the beginning of the tape and then is fast-forwarded to the specified point.

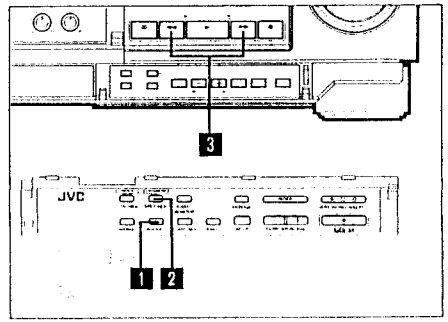
Time Search function

The Time Search function lets you locate a point on the tape a specified time span away from the current position in either direction.

1 Press ZIELLAUF while in the Play, Stop or Still mode.
2 Press the CURSOR ⊢– / –⊣ 14 or TV PR. ∨ / ∧ buttons 34 to specify the direction of search.
3 Specify the time (from the current position) to the point to be located, by using the numeric keys.
4 Press ► /X2 or ■ .
- The tape will move to the specified point and automatically start playback or stop.

Notes:
- Each step in the operation procedure must be followed by the next within 60 seconds, otherwise the Go To or Search mode will be cancelled.
- If the ZIELLAUF button was pressed in the Play or Still mode, when the specified point is reached, a still picture will be displayed as a result of having pressed the ❚❚ button instead of ► or ■ , after having keyed in the time.
- Use of other control buttons, while in either the Time Go To or Search mode, cancels that mode.
- If the specified time exceeds the tape length, the tape fast forwards to the end and then rewinds to the beginning and stops.

COUNTER MEMORY FUNCTION/LAP TIME INDICATION



Counter Memory function

1 Press the ZAHLWERK-RUCKST. button ⓯ at a point which you may wish to locate later.
- The counter will read "0St 00M 00S".

2 Press the ZAHLWERK-SPEICHER button ⓮ . [S] will appear in the FDP.

3 Press the RÜCKLAUF (or VORLAUF) button ⓬ when you need to return to the designated point.
The tape will rewind (or fast forward) and stop at about the *"0St 00M 00S" counter reading automatically.*

Lap Time Indication

When you need to know the exact time of a recording, press the ZAHLWERK-RUCKST. button before starting recording or playback. The counter will be reset to "0St 00M 00S" and show the exact elapsed time as the tape runs.

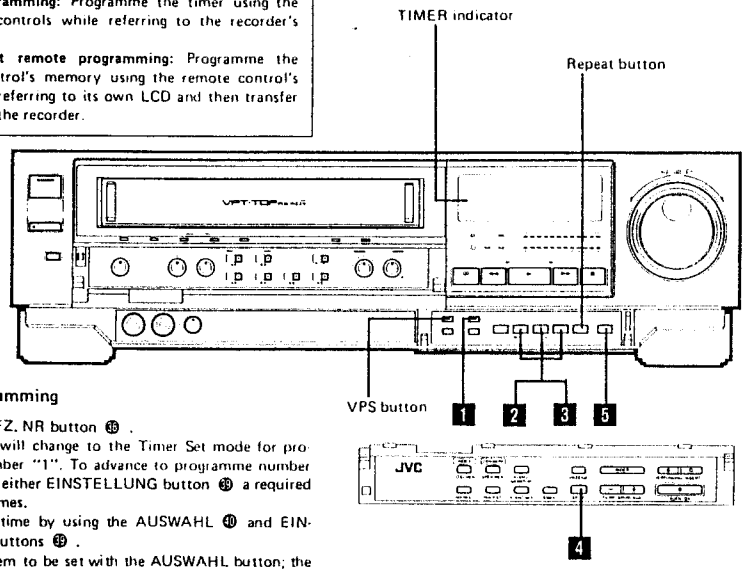
AUTOMATIC TIMER RECORDING

First of all, load a cassette (with safety tab in place); power will be switched on automatically.

Two ways to perform timer programming

A. **Local programming:** Programme the timer using the recorder's controls while referring to the recorder's FDP.

B. **Independent remote programming:** Programme the remote control's memory using the remote control's keys while referring to its own LCD and then transfer the data to the recorder.

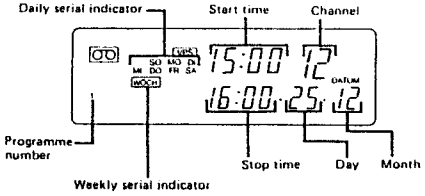


A. Local Programming

1 Press the AUFZ. NR button ⑱ .
- The display will change to the Timer Set mode for programme number "1". To advance to programme number 2 – 8, press either EINSTELLUNG button ⑲ a required number of times.

2 Set the start time by using the AUSWAHL ⑩ and EINSTELLUNG buttons ⑲ .
- Select the item to be set with the AUSWAHL button; the selected item will blink.
- Set the desired data with the EINSTELLUNG -/+ buttons.
- To record a weekly serial, press the WOCH button ⑪ once.
- To record a daily serial starting on a certain day, press WOCH. twice.

3 Set the stop time, date and channel in succession in the same way as for setting the start time.
- To record a daily serial starting on the day of setting, there is no need to enter any date figure; simply advance to the next item.
- When not using the VPS recording system, before setting the channel, press the VPS button to make "VPS" disappear.
- For programming the timer to record an external source, while the channel position is blinking, press EINSTELLUNG -/+ until the "AU" indicator appears in the channel display section on the FDP.



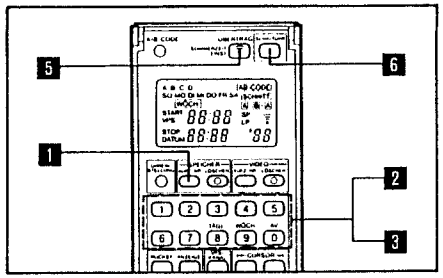
- For programming the timer to record an FM simulcast programme, press the SIMUL button ⑰ on the recorder at any stage while programming; "SIM" will appear on the FDP.

4 Press the SP/LP button ⑨ to obtain the desired recording mode indication on the display.
- The SP or LP entry can be made anytime while in the Timer Set mode.

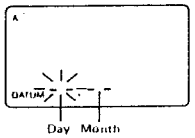
5 After making sure that the cassette is loaded, press the SCHALTUHR button ⑫ .
- The Timer Recording Standby mode will be engaged with the TIMER indicator and the preset programme number(s) illuminated and the power turned off.
- With no cassette loaded, the TIMER and "cassette loaded" indicators will continue blinking.
- A cassette whose safety tab has been removed will be ejected automatically.
- If a preset programme contains errors, that programme number will not be illuminated. Recheck the programmed data.

B. Independent Remote Programming

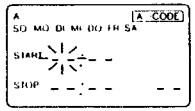
- The remote control incorporates 4 programme memories (A, B, C and D).
- The programmed data is held in memory even after it has been transferred to the recorder.



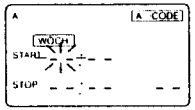
1 Press the SPEICHER AUFZ. NR. button ⑤ .
- The LCD will be activated for programme memory "A".
- To advance to programmes B to D, press again.



2 Enter the date using numeric keys ⑩ .
- Invalid numbers will be rejected.
- To record a daily serial starting on the day of setting, press the CURSOR key "→|" ⑭ without entering any date figure.
- To record a daily serial starting on a certain day, press [8] and enter the date.
- To record a weekly serial, press [9] and enter the date.

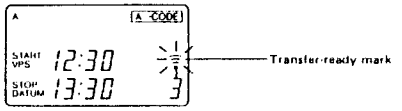


For daily serial setting



For weekly serial setting

3 Enter the start time, stop time and channel in succession.
- To key in a one-digit number of hours or minutes, first press [0] . Then press the relevant numeric key.
- When not using the VPS recording system, before setting the channel, press VPS to make "VPS" disappear.
- For programming the timer to record an external source, press the numeric key "0" while the channel is blinking; "AU" will appear on the LCD. When transferred in step **5** , "AU" will appear in the channel display section on the FDP.
- After the channel has been entered, the transfer-ready mark will appear and blink.



4 Press the SP/LP button ⑨ to obtain the desired recording mode indication on the display.
- The SP or LP entry can be made anytime while in the Timer Set mode.

5 Direct the remote control to the recorder's Remote Sensor window ⑥ and press the UBERTRAG button ⑫ .
- The programmed data will be loaded in one of the recorder's memories (1 – 8), the vacant one of the smallest programme number.
- If all programme memories are full, the recorder's clock will blink and transmission will not take place.
- Call up the programme(s) to be cancelled by pressing the VIDEO AUFZ. NR. button ⑧ , then press the VIDEO LOSCHEN button ⑨ to cancel it. Data transfer can now be made by pressing UBERTRAG again.

6 Press the SCHALTUHR button ⑫ .
- Check to see that the TIMER indicator and other items on the recorder's FDP respond correctly. See page 62.

How to use the CURSOR keys (|←/→|) ⑭
- If you press a wrong key and the flashing position has advanced, press |← to return to the previous position for correction.
- Once all data have been programmed, you can reach any position for correction using |← or →|. The flashing position is ready for re-entry.
- Pressing the SPEICHER AUFZ. NR. button ⑤ on the remote control engages the LCD in the transfer-ready mode in which the transfer ready mark is flashing and data correction is not possible. For correction of data, press either cursor key to move to the position which requires correction.

Setting the date, start and stop times, and channel
- It is not possible to set the date, start and stop times unless the date and clock have previously been set.
- Enter the data while the digits are blinking.
- The stop time can be set within 24 hours from the start time.
- Non-applicable numbers (such as January 32, February 30 for dates, 24 or larger for hours, 60 or larger for minutes and 49 or larger for channels) will be rejected when keyed in.

Cancelling the preset data
- The preset programmes can be cancelled. First engage the Timer Set mode for the programme number you wish to cancel and then press the LOSCHEN button ⑱ or the VIDEO LOSCHEN button ⑨ . Or for the remote control's memory, press the SPEICHER LÖSCHEN button ⑦ .
- An executed programme is automatically cleared.

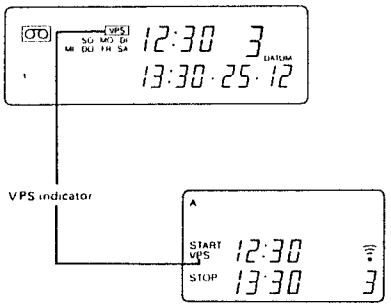
Checking the programmed data
- Checking can be performed anytime, even after the SCHALTUHR button has already been engaged. To do this, press AUFZ. NR. ⑱ while in the Timer Standby mode. The programme number will blink on the FDP and you can check each programme by advancing programme numbers with the EINSTELLUNG buttons ⑲ . If re-programming is required, disengage the Timer Standby mode and use the regular programming method. Pressing the AUFZ. NR button and/or EINSTELLUNG buttons engages the FDP in the check mode in which no position flashes and data correction is not possible. For correction of data, press the AUSWAHL button ⑩ and move the cursor to a position which requires correction.

Timer recording operation
- When the preset start time is reached, recording starts.
- After timer recording, the power is switched off. If the tape end is reached during timer recording, the cassette is automatically ejected and the power is switched off.

VPS RECORDING

In the VPS (Video Programme System) system, TV stations transmit different VPS codes for different TV programmes, which control the starting and stopping of the video recorder and have precedence over times preset in the timer for accurate recording of a particular programme from start to finish.

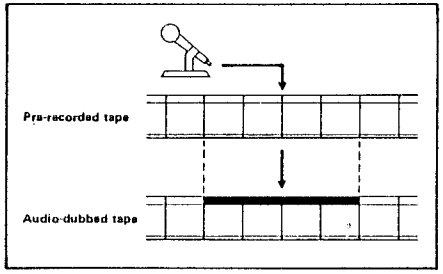
1. Press the AUFZ. NR. button ⑯ (or the VIDEO AUFZ. NR. button (8)) or, for the remote control's memory, the SPEICHER AUFZ. NR. button (5) .
2. Set the date, start time, stop time and channel in the same way as for timer programming.
3. Press the KANAL-EINSTELLUNG ⑱ or the VPS/KANAL button (3) .
   - All timer data will be converted to VPS codes and stored in memory.
4. Press the SCHALTUHR button ⑫ or (3) .
   - The recorder will enter the VPS standby mode at 20:00 on the day previous to the preset day and remain engaged until 3:59 on the following day, if the intended programme has not yet been broadcast.
   - When a VPS code corresponding to the intended TV programme is detected during the VPS standby mode, recording will start. When the VPS code changes to another, recording will stop.
   - When an interruption code is detected during VPS recording, the VPS standby mode is engaged and recording restarts when the regular VPS code is restored.



Note:
- Operation at the end of VPS recording is the same as with ordinary timer recording.

AUDIO DUBBING

Audio dubbing means recording a new soundtrack on a pre-recorded tape. In other words, the previously recorded sound is erased and replaced with a new soundtrack. **Audio dubbing is applicable only to the longitudinal audio track (normal audio).** Therefore, a dubbed narration can be heard together with the original hi-fi sound.



Operation
1. Switch on the TV receiver.
   - Adjust the TV receiver's channel to your video channel.
2. Load a pre-recorded cassette. Power will be switched on automatically.
3. Connect a microphone to the MIKROFON jack ㉑ .
4. Be sure that the MIK. PEGEL control ⑮ is set to the appropriate level when required. Connect a pair of headphones to monitor this sound level adjustment.
5. Press either TV PR. button to obtain "AU" on the FDP.
6. Press WIEDERG./X2 ㉕ to start playback and then press RÜCKLAUF or VORLAUF ㉘ to search for the point from which you wish to start audio dubbing.
7. Press PAUSE/STANDB. ㉗ at the start point of audio dubbing.
8. Press VERTONUNG ⑬ .
9. Press WIEDERG. /X2.
   - Audio dubbing will start.

Note:
- If whistling or howling is heard during audio dubbing, reduce the TV volume or move the microphone farther away from the TV. Recording is being performed even if sound is not heard from the TV receiver. If you want to monitor the sound being recorded, connect headphones to the KOPFHÖRER jack.

CAUTION:
- Audio dubbing is not possible with an audio source connected to the rear panel AUDIO EING. connectors.
- During audio dubbing, the recorder's pause function cannot be controlled by a unit connected to the rear panel remote PAUSE FERNBEDIENUNG EING. terminal.

RECORDING FROM AN EXTERNAL SOURCE

By connecting an external video source (such as a 2nd video recorder, VideoMovie camera-recorder, etc.) to the AUDIO/VIDEO socket, tape-to-tape transfer is possible.
- For connection of these units an appropriate cable is necessary.

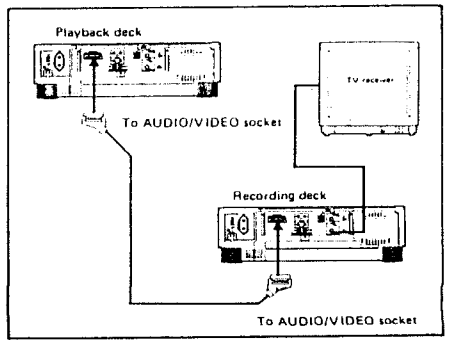
Connection
1. Connect the AUDIO/VIDEO socket ㉙ to the appropriate audio/video output of the 2nd video recorder.
2. Connect a TV receiver to the recorder to monitor the picture while recording.

Operation
1. Turn the power on for all connected equipment.
2. Tune the TV receiver to your video channel.
3. Load a cassette with its safety tab in place.
4. Press either TV PR. button ⑱ or the numeric key 0/AV (10) to obtain "AU" in the channel display section on the FDP.
5. Press the AUFN./DA button ⑯ and the PAUSE/STANDB. button ㉗ to put the recorder in the Record Pause mode.
6. Play back a tape on the source equipment to determine the segment to be recorded.
7. Press the WIEDERG./X2 button ㉕ to start recording.
8. To stop recording temporarily, press the PAUSE/STANDB. button.
9. To end recording, press the STOP button ㉚ .

Note:
- For the operation of the source equipment, refer to the instruction manual of the relevant machine.

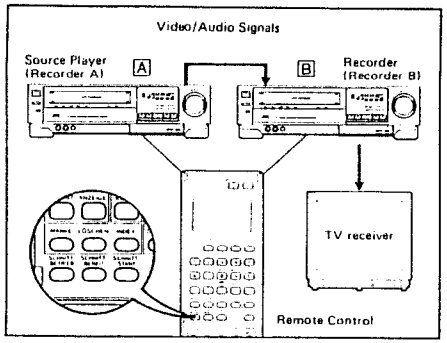
Editing from a VideoMovie
This recorder is equipped with a remote PAUSE FERNBEDIENUNG EING. terminal. When the recorder is connected to a VideoMovie which incorporates a Master Edit Control system, you can control the recorder with the VideoMovie's controls for making edits free of transition-point gaps and distortion. Refer to the VideoMovie's instruction manual for detailed operating procedures for editing.

Note:
- For direct recording with a video camera, a camera adapter is also necessary.



DUET EDITING

Designed specifically to simplify editing operations, the Duet Editing function delivers separate commands to two recorders simultaneously via a single remote control, taking advantage of the A/B code system. (JVC dedicated models only.)



Preparations

- Connect two recorders as described in "RECORDING FROM AN EXTERNAL SOURCE" on the previous page.
- Set one recorder to respond to A code signals, the other, to respond to B code signals. (See page 44.)
- Place the two recorders side by side.

Notes:

- JVC video recorders with infrared remote control units which are not equipped with an A/B-CODE select switch are designed to receive A-code signals. Therefore, Duet Editing is possible with JVC decks if the HR-D950EG is set to respond to B-code signals.
- It is not possible to perform Duet Editing unless the remote control's clock has been previously set.

OPERATION

Remote Control	Recorder A (Source player)	Recorder B (recorder)
	Load a recorded tape.	Load a blank tape.
1. Press SCHNITT-BETRIEB. "SCHNITT Ⓐ → Ⓑ" appears on LCD.		
2. Press SCHNITT-BEREIT.	Enters STILL mode.	Enters RECORD-PAUSE mode.
3. Search for an edit-in point on the source tape. Press ❚❚ .	Functions as commanded. (In this state, only recorder A responds to the remote control's commands.)	Remains in RECORD-PAUSE mode.
4. Press SCHNITT-START.	Enters PLAY mode.	Enters RECORD mode.
5. Press ❚❚ .	Enters STILL mode.	Enters RECORD-PAUSE mode.
6. Repeat steps 3, 4 and 5 to continue editing.		

Notes:

- You can use Recorder B (the recorder set to respond to B code signals) as a source player and Recorder A as a recorder. In this case, press the A/B-CODE button in step 1 to obtain "SCHNITT Ⓑ → Ⓐ " indication.
- To cancel the Duet Edit mode and return to normal remote control functions, press the SCHNITT-BETRIEB button so that the SCHNITT indication disappears.
- When the START button is pressed, the recorder takes a few seconds before actual editing starts due to the automatic back-space editing system. At the same time the START button is pressed, the player starts playback from the specified edit-in point. Therefore, it is recommended that you specify a point slightly before the intended edit-in point in step 3 for more accurate editing. This also ensures that the picture of the resulting edit will be more stable.
- Preroll editing (see page 67) does not take place with Duet Editing.

Since the HR-D950EG comes equipped with a SCHNITT-VORLAUF swtich and a PAUSE FERNBEDIENUNG AUSG. terminal, synchronized preroll editing is possible for high-quality editing results. Preroll editing is possible with a preroll time of about 5 seconds when the HR-D950EG is used as the recorder and a second deck with a preroll-capable REMOTE PAUSE terminal is used as the player. JVC's recorders with a preroll-capable REMOTE PAUSE terminal include: HR-D530, HR-D700, HR-D750, HR-S5000, HR-D520, HR-D600, HR-D620, HR-D830 and HR-S5500.

Connection

- Connect two decks using a 21-pin Euro-cable as illustrated on page 65.
- Connect the HR-D950EG's PAUSE FERNBEDIENUNG AUSG. terminal to the second deck's REMOTE PAUSE terminal using a mini-plug cable.

PREROLL ASSEMBLE EDITING

- **Set the SCHNITT-VORLAUF switch to EIN.**

1. Play back the source tape and engage the Still mode at the edit-in point. (Player)
2. Play back the recording tape and engage the Still mode at the edit-in point. (HR-D950EG)
   - Use the SHUTTLE ring for search. Releasing it engages the Still mode.
3. Press the AUFN./DA button of the recorder.
   - Both tapes will preroll in sync with each other, after which the recorder enters the Record-Pause mode and the player enters the Still mode. The monitor screen will show the still picture of the source tape.
4. Press the WIEDERG./x2 button of the recorder.
   - The prerolled section will be played back on both decks and editing will start at the specified edit-in point.
5. Press the PAUSE/STANDB. button of the recorder to stop editing.
   - The recorder will preroll and stop in the Record-Pause mode.
   - The player will enter the Still mode.
6. Search for the edit-in point of a next edit on the source tape and engage the Still mode. (Player)
7. Press the PAUSE/STANDB. button of the recorder.
   - The recorder will remain in the Record-Pause mode.
   - The player will preroll and enter the Still mode.
8. Press the WIEDERG./x2 button of the recorder.
   - Editing will start at the specified edit-in point.
9. Press the PAUSE/STANDB. button of the recorder to stop editing.
10. To continue assemble editing, repeat steps 6 through 8.
11. To end preroll editing, first press the player's STOP button and then the recorder's STOP button.

Note:

- A preroll command is given to the player by pressing the recorder's AUFN./DA button while in the Still mode, or PAUSE/STANDB. button while in the Record-Pause mode. This function is available only with the first pressing of the button in the corresponding status. Therefore, do not press it until the player stands by at the edit-in point in the Still mode.

Tips for obtaining better results

The quality of the edited tape may vary depending on the position of the SCHNITT switch. It is recommended that you first make some trial recordings.

- With the SCHNITT switch of the playback deck set to ON and recording deck to OFF.
- With the EDIT swtich of both playback and recording decks set to ON, and
- With the SCHNITT switch of both decks set to OFF.

Choose the setting combination that best suits your preference.

PREROLL INSERT EDITING

Insert editing means recording a new scene into a section of pre-recorded tape so that a part of the original recording can be replaced with a new sequence without excessive picture distortion at edit-in and edit-out points. Thanks to the flying erase head, clean edits can be obtained.

> Important
> Since video and hi-fi audio signals are recorded simultaneously, both are replaced with new recordings simultaneously. The normal audio soundtrack remains unchanged. However, by using the insert editing and audio dubbing functions together, all signals can be replaced simultaneously.

- Set the SCHNITT-VORLAUF switch to EIN.

1. Play back the source tape and engage the Still mode at the edit-in point. (Player)
2. Play back the recording tape and engage the Still mode at the edit-in point (the beginning of the section to be replaced). (HR-D950EG)
   - Use the SHUTTLE ring for search. Releasing it engages the Still mode.
3. Press the INSERT button of the recorder.
   - Both tapes will preroll in sync with each other, after which the recorder enters the Insert Standby mode and the player enters the Still mode. The monitor screen will show the still picture of the source tape.
   - If the normal audio track is to be replaced, press the VERTONUNG button after completion of preroll.
4. Press the WIEDERG./x2 button of the recorder.
   - The prerolled section will be played back on both decks and insert editing will start at the specified edit-in point.
5. Press the PAUSE/STANDB. button of the recorder to stop insert editing.
   - The recorder will preroll and stop in the Record-Pause mode.
   - The player will enter the Still mode.

Notes:
- Do not use the STOP button to stop insert editing. If you press the STOP button, the Insert Edit mode will be cancelled and distortion will result at the edit-out point.
- For automatic stop of insert editing, you can specify the edit-out point on the recording tape in advance. For this purpose, first locate the edit-out point (the end of the section to be replaced) and press the ZAHLWERK RUCKST. button. Then rewind to the edit-in point and start insert editing as described above. When the counter "zero" reading is reached, insert editing will stop automatically. The recorder will enter the Play mode and the player will enter the Still mode.
- The recording mode (SP or LP) is automatically determined by the previous recording onto which the new segment is inserted, regardless of the setting of the SP/LP button.
- If the recording mode changes from SP to LP, or vice versa, in a single edit, the inserted picture will be distorted at the switching point.
- If there is a non-recorded section on the recording tape, the Insert Edit mode will be cancelled automatically, and the recorder will switch to the Play mode while the player will enter the Still mode.

FADE-IN/FADE-OUT

To give a professional touch to your edited tape, the HR-D950EG has a built-in white fader.

Fade-in
- To start an edit with fade-in, press the FADER button, instead of the WIEDERG./x2 button, to start editing from the Record-Pause mode.
- The edit will start with a blank white screen and fade in to normal in about 5 seconds.
- Keeping the FADER button depressed does not extend the fade-in time.

Fade-out
- To end an edit with fade-out, press the FADER button, instead of the PAUSE/STANDB. button, to stop editing.
- The picture will fade out in about 5 seconds, and the recorder will enter the Record-Pause mode.

Notes:
- Audio does not fade.
- The FADER button has no effect on the playback or TV picture.
- Fades cannot be applied to SECAM input signals.

IN CASE OF DIFFICULTY

What may initially appear to be trouble is not always a real problem. Make sure first . . . .

POWER AND TAPE TRANSPORT PROBLEMS

Symptoms	Check points
No power is applied to the recorder.	• Is the power cord disconnected? – Connect it.
Clock is functioning properly, but the recorder cannot be powered.	• Is the TIMER indicator lit on the FDP? – Press SCHALTUHR to disengage the Timer Recording Standby mode.
Tape does not run during recording.	• Is the PAUSE/STANDB. button engaged? – Press the WIEDERG./x2 button.
Tape stops in the Rewind or Fast-Forward mode.	• Is the ZAHLWERK SPEICHER switch set so that [S] appears on the FDP? – Press to make [S] disappear.
Tape will not rewind or fast forward.	• Is the tape already fully rewound or fast forwarded? – Check the cassette.

RECORDING PROBLEMS

Symptoms	Check points
Recording cannot be started.	• Is a cassette loaded? • Is the safety tab on the cassette removed? – Reseal the slot with cellophane tape.
Camera recording is not possible.	• Are the camera and the camera adapter correctly connected? • Is the power switch of the camera adapter set to ON? • Does the channel display indicate "AU"? – Press "0/AUX".
Simulcast recording is not possible.	• Has the SIMUL button been pressed? – Press it so "SIM" appears on the FDP. • Is an audio source correctly connected to the AUDIO EING. connectors? – Check connections.
Timer recording is not possible.	• Have you set the clock correctly and programmed the timer correctly? – Check once again. • Is the TIMER indicator lit on the FDP? – Press SCHALTUHR.

PLAYBACK PROBLEMS

Symptoms	Check points
Playback picture does not appear while the tape is running.	• Is the TV receiver's channel selector set to the correct video channel? – Set it to the RF converter channel. (See page 46.)
Noise appears during playback.	• Press SPURLAGE buttons. (See page 54.)
Playback picture is blurred or interrupted while TV broadcasts are clear.	• Video heads may be dirty. – Head cleaning is necessary. Consult your JVC dealer.

HI-FI AUDIO PROBLEMS

Symptoms	Check points
TV sound cannot be recorded on hi-fi audio track.	• Has the SIMUL button been pressed? – Press it again so "SIM" no longer appears on the FDP.
Soundtrack on the hi-fi audio track cannot be reproduced.	• Is the NORMAL indicator lit? – Press the AUDIO-MIX button for Hi-Fi L and R to light as required.

OTHERS

Symptoms	Check points
Whistling or howling is heard from TV.	• Move camera or microphone away from TV or reduce TV sound volume.
Some channels are skipped over when selecting a channel.	• Those channels are preset to be skipped over. If you need them, restore them. (See page 50.)
Channel cannot be switched.	• Is recording in progress? – Press PAUSE/STANDB., select a desired channel and press WIEDERG./x2.
The recorder cannot be operated with the remote control.	• Is the AB-CODE indicator showing the proper code for the recorder being operated? – Press the A/B-CODE button to switch the remote control to the correct setting.

This recorder contains microcomputers. External electronic noise or interference could cause malfunctioning. In such cases, switch the power off and unplug the power cord. Then plug it in again and switch on. Take out the cassette. After checking the cassette, operate the unit as usual.

HEAD CLEANING

- Picture playback may become blurred or interrupted while the TV programme received is clear. This does not mean that the recorded programme has been erased.
- Dirt accumulated on the video heads after long periods of use causes such problems. In this case, head cleaning requiring highly technical care is necessary.

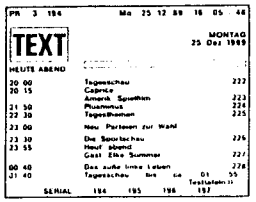
For head cleaning, consult your JVC dealer.

TELETEXT COMPATIBILITY

Teletext services are becoming popular and a vast number of teletext pages are now available for a variety of information. This recorder is ready to take advantage of these services, not only for simple viewing but also for programming the recorder's built-in timer in an extremely easy way. All you need to do is connect the optional VPT or VPV adapter to the rear of the recorder. Then the recorder's remote control exhibits its full capability with all the dual- or triple-function control keys working as intended. The following information shows examples of using the optional VPV adapter.

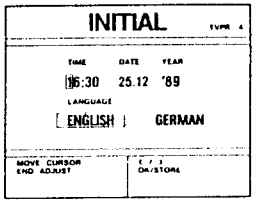
TELETEXT

- View broadcast teletext pages.
- Several page access modes are available for quick and convenient viewing.
- Programme the timer using TV schedule pages.

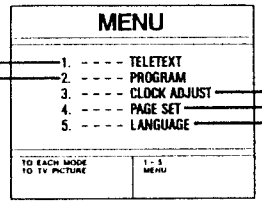


CLOCK ADJUST

- Set the VCR's clock manually with 10-key input.

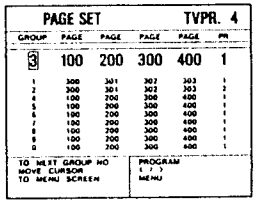


MENU



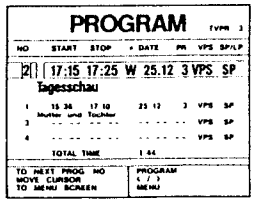
PAGE SET

- Preset teletext pages so that you can quickly access your favourite or frequently-referred-to pages.
- Four pages can be preset for each of the keys, 0 to 9, totalling 40 pages.



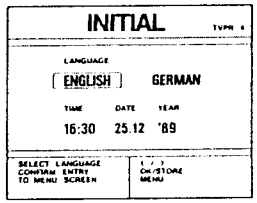
PROGRAM

- Check the timer recording data on the colour display.
- Programme the timer manually with 10-key input.



LANGUAGE

- Select either English or German for on-screen messages.



SECTION 1
DISASSEMBLY AND MECHANISM ADJUSTMENTS

1.1 DISASSEMBLY

1.1.1 External covers (See Fig. 1-1-1)

1. Top cover

1) Take out four screws (A) and one screw (B) from the right, left and rear sides of the set.
2) Tilt up the rear end of the top cover in direction (1) then remove the top cover.

2. Front panel

1) Remove the top cover.
2) Take out three screws (C) from the front panel assembly.
3) Carefully bend three hooks (V) of the front panel assembly from the upper side of the chassis in order to disengage the hooks from the chassis.
4) Pull the front panel assembly toward direction (2) to disengage three hooks (D) of the front panel assembly from the bottom of the chassis, then remove the front panel assembly.

3. Bottom cover

1) Take out two screw (E) from the bottom of the set, then remove two feet.
2) Take out ten screws (F) from the bottom of the set, then remove the bottom cover.

4. Cassette housing assembly

1) Take out two screws (G) and one screw (L) from the Main and Terminal board assemblies.
2) Take out two screws (H) from the mechanism base.
3) Pull the cassette housing assembly toward front to disengage the two claws (J).
4) Carefully tilt up the cassette housing assembly in direction (3) and disconnect connector (K) then remove the cassette housing assembly.

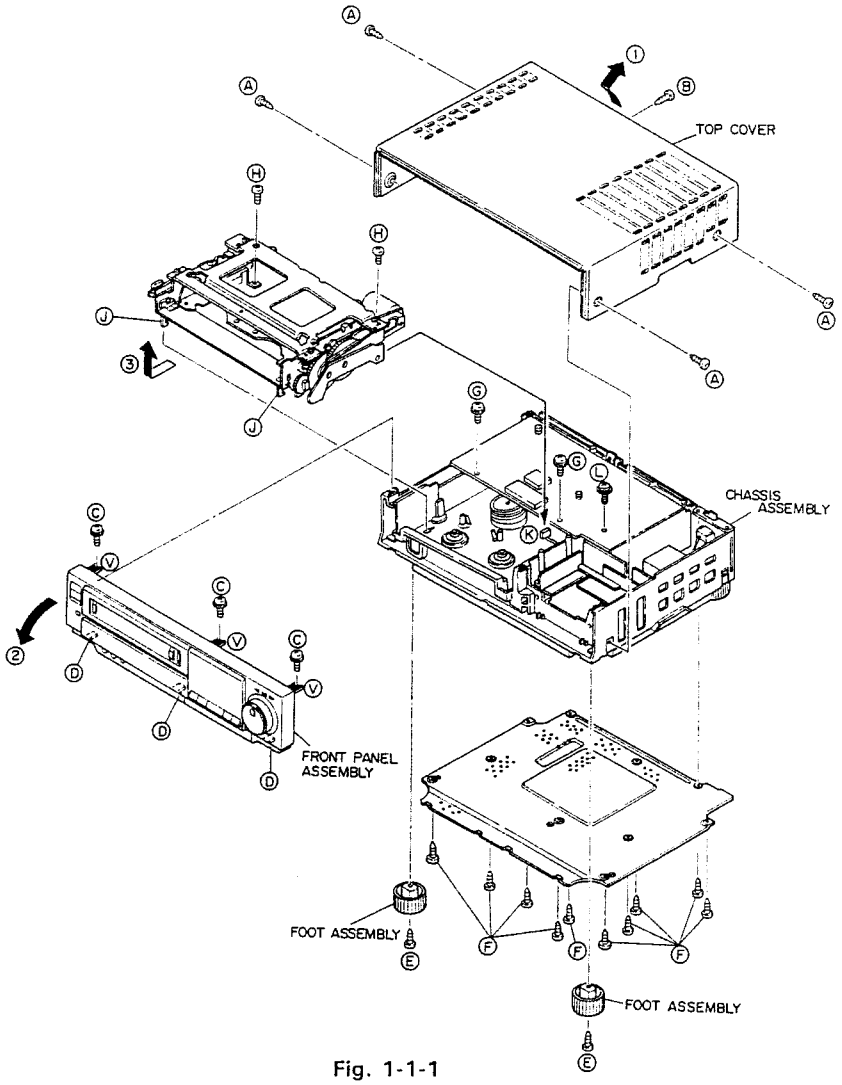


Fig. 1-1-1

1.1.2 Circuit boards (See Fig. 1-1-2)

1. Main and Terminal board assemblies
1) Take out two screws (L) and one screw (M), then raise the Main and Terminal board assemblies to remove them.

2. Servo board assembly
1) Take out one screw (Q) and remove the bracket.
2) Raise the Servo board assembly to remove it.

3. Tuner CTL and IF board assemblies
1) Take out two screws (N) and remove the Tuner CTL and IF board assemblies.

4. Switching and Regulator board assemblies
1) Remove the AC cover.
2) Take out three screws (T) and remove the switching and Regulator board assemblies.

5. Auto tracking board assmelby
1) Take out one screw (S) and remove the bracket.
2) Raise the Auto Tracking board assembly to remove it.

6. Flying Erase board assembly
1) Take out one screw (P) and remove the bracket.
2) Raise the Flying Erase board assembly to remove it.

7. Demodulator board assembly
1) Take out two screws (U) and remove the Demodulator board assembly.

8. PRE/REC board assembly
1) Take out two screws (R) and remove the PRE/REC board assembly.

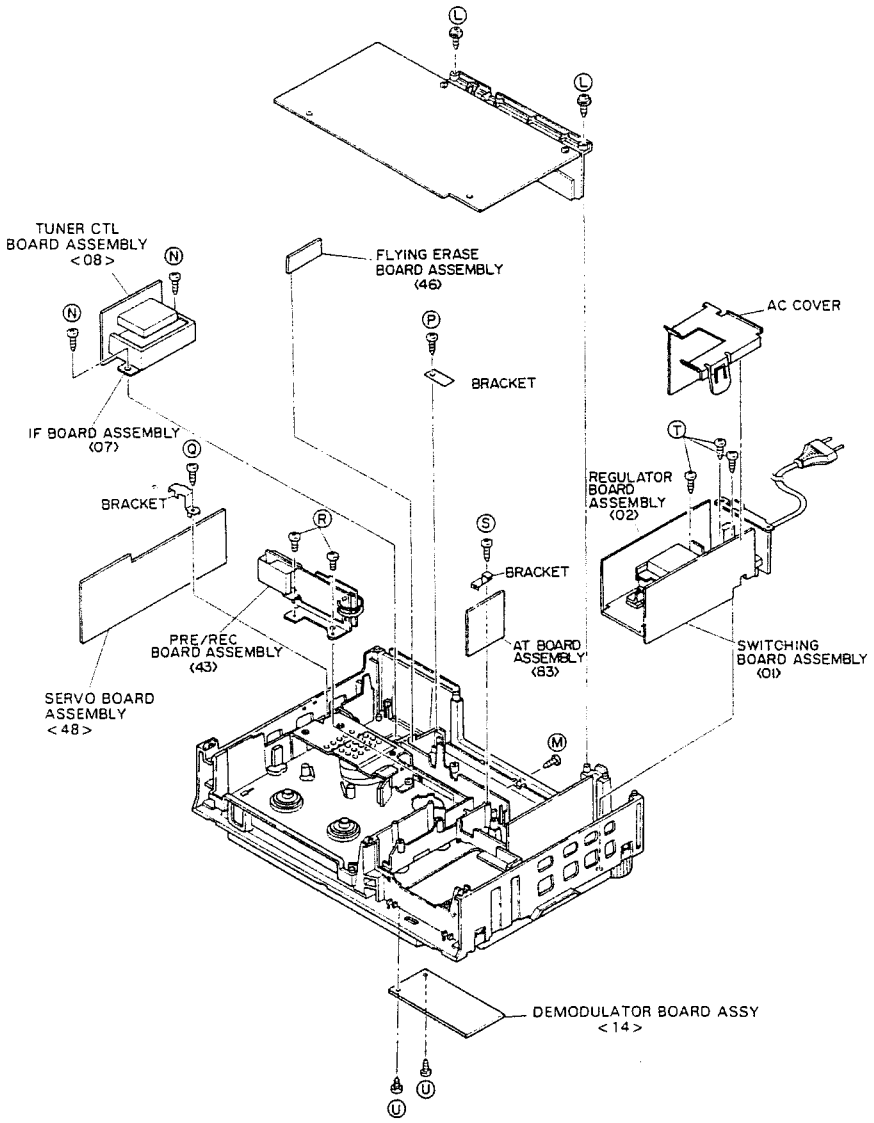


Fig. 1-1-2

1.3 MAIN MECHANISM PARTS

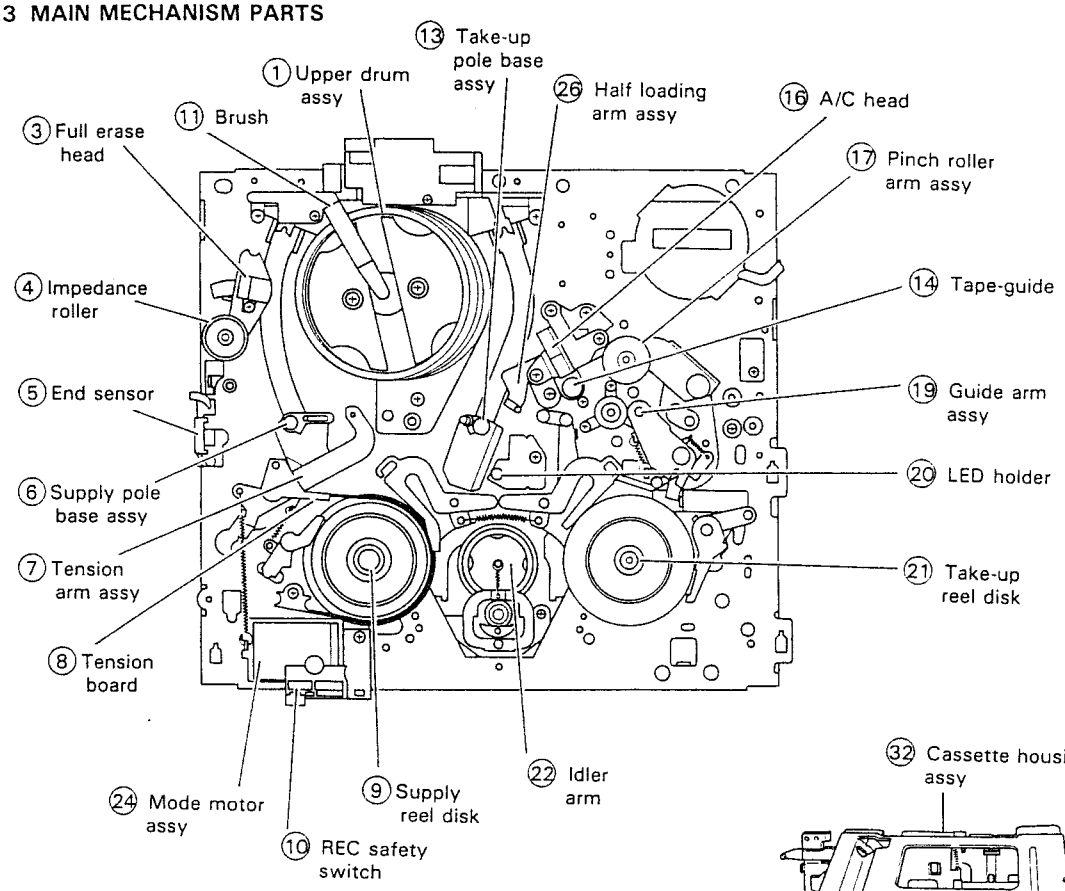


Fig. 1-3-1

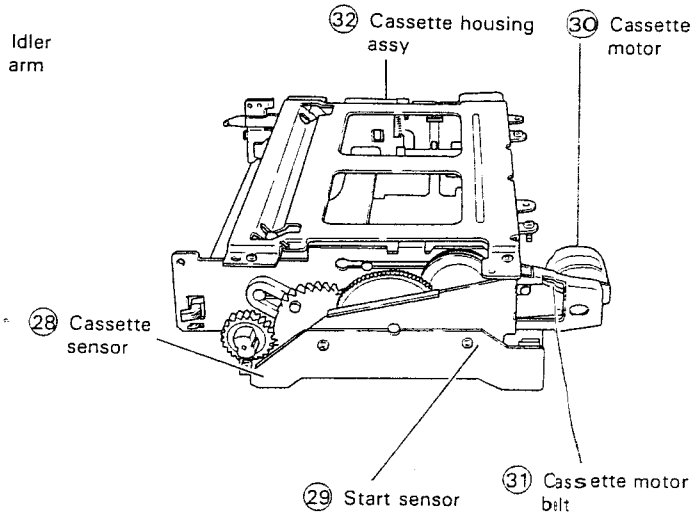


Fig. 1-3-2

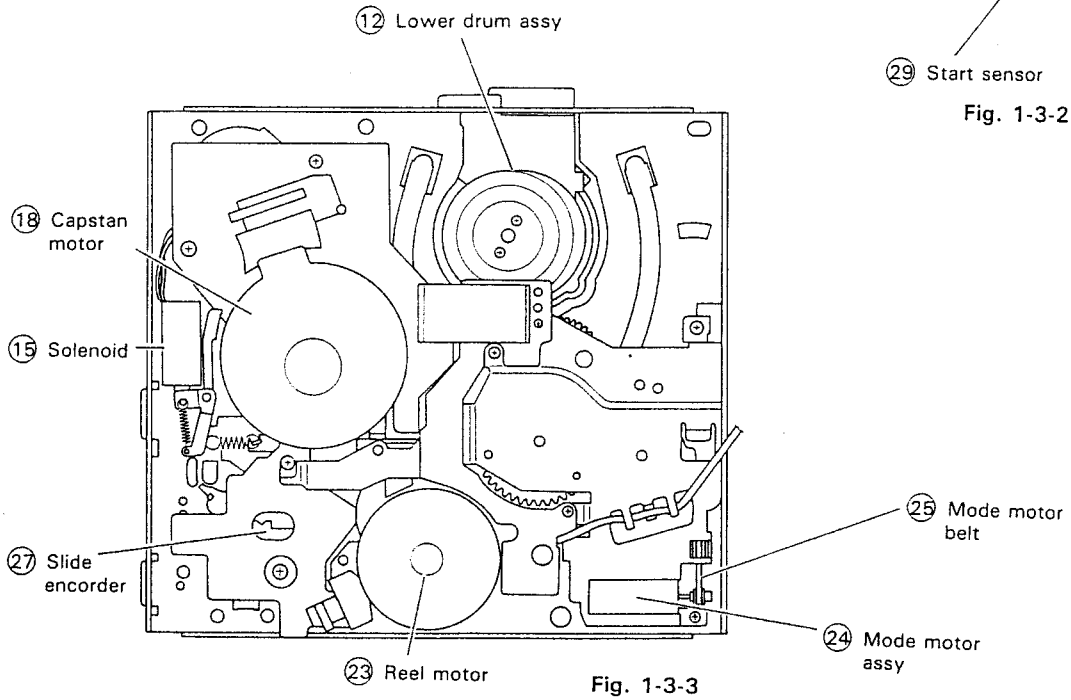


Fig. 1-3-3

1.3.1 Main mechanical parts

See Fig. 1-3-1, 1-3-2 and 1-3-3.

No.	Parts No./Symbol No.	Parts Name
1	PDM2137A/(M3-2A)	Upper drum assy
2	—	—
3	PU57641-2/(M4-5)	Full erase head
4	PQ41955/(M4-9)	Impedance roller
5	PN268R-NC/(54-Q1)	End sensor
6	PU60556-1-2/(M4-23)	Supply pole base assy
7	PQ43710A/(M4-1)	Tension arm assy
8	PQ41948A/(M4-3)	Tension band
9	PU59250-1-2/(M4-42)	Supply reel disk
10	PU58644-1-3/(53-S1)	Rec safety siwtch
11	PDM4015B/(M3-2D)	Brush
12	PDM2113D/(M3-2C)	Lower drum assy
13	PU60557-1-4/(M4-22)	Take-up pole base assy
14	PU53629-3/(M4-25)	Take-up guide pole
15	PU60537-2/(M4-103)	Solenoid
16	PU60560/(M4-15)	Audio/control head
17	PQ42006B/(M4-68)	Pinch roller arm assy
18	PU60201V/(M4-29)	Capstan motor
19	PQ32676A/(M4-72)	Guide arm assy
20	PU59925-1-1/(M4-82)	LED holder
21	PU58638-1-2/(M4-43)	Take-up reel disk
22	PU58645-1-4/(M4-32)	Idler arm
23	PU59926V/(M4-39)	Reel motor
24	PQ41996B/(M4-51)	Mode motor assy
25	PQM30003-20/(M4-58)	Mode motor belt
26	PQ42979A-2/(M4-89)	Half loading arm assy
27	PU59924/(M4-85)	Slide encorder
28	PU58879/(56-PHS1)	Cassette sensor
29	PN268R-NC/(56-Q1)	Start sensor
30	PQ42385C/(M3-6A)	Cassette motor assy
31	PQM30003-19/(M3-7C)	Cassette motor belt
32	PUS29142B-1/(M3-6)	Cassette housing assy

- Symbol interpretation example

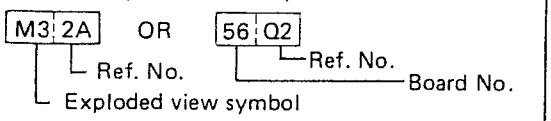


Table 1-3-1

1.3.2 Cleaning

Periodic cleaning of the tape transport system is desirable, but ordinarily not feasible in practice. Therefore, perform cleaning when a set is brought in for repairs or maintenance. Heavy contamination of the video heads, tape guides and brushes can detract from playback picture quality and in extreme cases, even damage the tape. For cleaning, use a fine-mesh cotton cloth (about the texture of a white dress-shirt) moistened in alcohol.

- To clean the video heads, press the moistened cloth gently against the upper drum with fingertip and turn the drum by hand.
  Do not use a vertical stroke, as this may damage the heads.

1.3.3 Lubrication

Oil and grease do not require periodic replenishing. Apply only when replacing lubricated parts (also clean and replace lubrication of mating parts if soiled).

1. Table 1-6-1 indicates the oil and grease used in this set. Use these or recommended locally available equivalents.

Category	Part Name	Part number
Oil	Video Oil	COSMO-HV56
Grease	Video Grease (Black)	MOS2-C
	" (Ivory)	DAPHNE-XLA-2

Table 1-3-2

2. Grease is not required for a replacement cassette housing assembly, as this has been applied at the factory.

Note: Stir grease that has been stored for an extended period.

1.4 INSPECTION AND MAINTENANCE

This product employs rotary and moving parts which wear out in the course of usage. Periodic inspection, cleaning, lubrication and maintenance are therefore important for ensuring maximum performance. Worn parts must also be replaced at regular intervals.

1.4.1 Suggested servicing schedule for main components

The following table indicates the suggested period for such service measures as cleaning, lubrication and replacement. In practice, the indicated periods will vary widely according to environmental and usage conditions. However, the indicated components should be inspected when a set is brought for service and the maintenance work performed if necessary.

Also note that rubber parts may deform in time, even if the set is not used.

System	Parts Name	Symbol No.	Periodic servicing schedule (operation hours)								
			250	500	750	1000	1250	1500	1750	2000	3000
Tape Transport	Upper drum	M3-2A	★	★	☆	●	★	★	☆	●	●
	Audio/control head	M4-15	★	★	★	★	★	★	★	☆	●
	Pinch roller	M4-68	★	★	★	★	★	★	★	★	●
	Full erase head	M4-5	★	★	★	★	★	★	★	★	●
	Tension arm	M4-1	★	★	★	★	★	★	★	★	★
	Lower drum	M3-2C									
	Capstan (shaft)	M4-29									
	Half loading arm	M4-89									
	Guide arm	M4-72									
	Take-up guide pole	M4-25									
	Supply slant pole	M4-23									
	Take-up slant pole	M4-22									
	Impedance roller	M4-9									
Drive	Capstan motor	M4-29								●	
	Reel motor	M4-39								●	
	Cassette motor	M3-6A									●
	Mode motor	M4-51									●
	Supply reel disk	M4-42				△				△	●
	Take-up reel disk	M4-43				△				△	●
	Idler arm	M4-32				○				●	
	Cassette belt	M3-6C				○				●	
	Mode motor belt	M4-58				○				●	
Others	Brush	M3-2D				○				○	○
	Tension band	M4-3				○				○	○

★ : Cleaning
☆ : Cleaning (or Replacement if necessary)
△ : Lubrication
No: Refer to Main mechanical parts

▲ : Lubrication (or Replacement if necessary)
● : Replacement
○ : Inspection (or Replacement if necessary)

Table 1-3-3 Approximate maintenance schedule

1.5 MAIN ASSEMBLY REPLACEMENT

No.	Item	Adjustment parts	Operating mode	Description
1	Upper drum assembly			**Note:** When installing the new upper drum, use care not to touch the video heads. If heads are soiled, clean with a soft, finely woven cotton cloth or chamois that has been moistened in alcohol. Hold lightly against the heads and turn the drum clockwise. By no means clean with a vertical stroke.
	— Removal —			1) Refer to Fig. 1-5-1. Take out screw (1) and remove the brush assembly. 2) Use a desoldering tool or desoldering braid to unsolder the upper drum boards. 3) Take out two screws (2) and raise the upper drum to remove it together with the upper drum board. (If this drum is to be reinstalled, use care not to touch or damage the heads.)
				Fig. 1-5-1 Upper drum assembly
	— Installation —			1) Refer to Fig. 1-5-1. Align the black relay pin of the new upper drum with the white marking of the lower drum. 2) Reinsert screws (2) and tighten them in a balanced manner. 3) Reinstall and solder the upper drum boards. 4) Clean the drum assemblies (see above note). 5) Reinstall the brush assembly and secure with screw (1).
				Fig. 1-5-2
	— Checks and adjustments —			After installing the upper drum, perform the following checks and adjustments (refer to appropriate Sections of this Manual). 1) FM waveform 2) Servo circuit 3) Video circuit 4) FM audio circuit

No.	Item	Adjustment parts	Operating mode	Description
2	A/C head (Audio/Control head) – Removal –			1) Disengage connectors attached to the A/C head board. 2) Take out two screws (1) and remove the A/C head together with the head base. 3) Unsolder and remove the A/C head board from the A/C head. 4) Take out three screws (3) and remove the A/C head from the head base. Use care regarding the three springs.

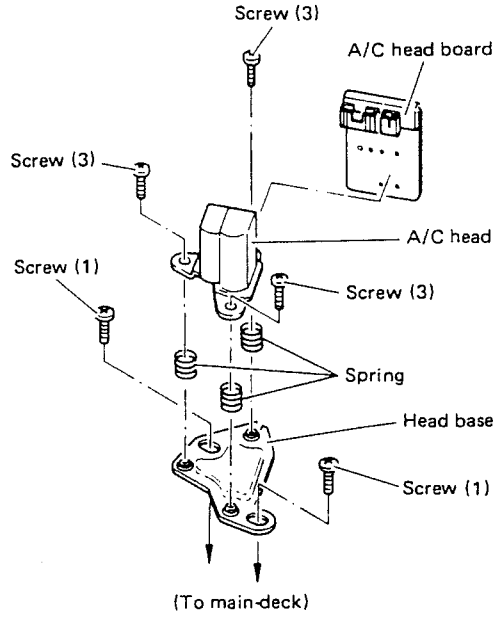


Fig. 1-5-3 A/C head

	– Installation –			1) Install the A/C head by reversing the removal stepsof above. 2) Temporarily set the A/C head height above the head base for 6.6 mm (see Fig. 1-5-4).

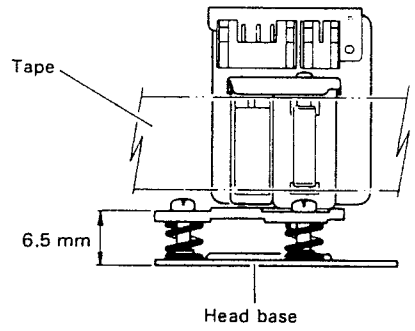


Fig. 1-5-4 A/C head height

	– Checks and adjustments –			1) Use a spare tape (not Alignment tape) and confirm proper operation of the tape transport (see Section 1.8). 2) Perform interchangeability adjustment (see Section 1.9).

No.	Item	Adjustment parts	Operating mode	Description
3	Tension band assembly			1) Take out screw (1) and disengage the tension band assembly from the tension arm assembly (see Fig. 1-5-5). 2) Remove and replace the tension band assembly. 3) Perform tension pole position adjustment (see Section 1.7).

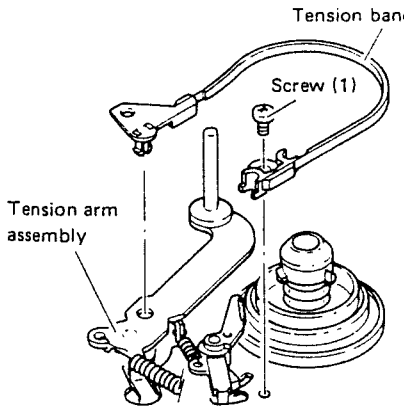


Fig. 1-5-5 Tension band assembly

1.6 ASSEMBLY PROCEDURE OF MECHANISM

No.	Item	Adjustment parts	Operating mode	Description
	A close relationship exists between the mode select switch and the mechacon circuit. Therefore, the mode select switch and control arm engagement determines the overall mechanical operations of the levers, gears, rollers, etc. If these parts are not properly positioned, the video deck becomes stalled in the unloading or Stop mode.			
1	Loading arm assemblies			These assemblies are comprised of loading gears, torsion springs and loading arms. 1) Refer to Fig. 1-6-1 and install the loading arm assemblies correctly.

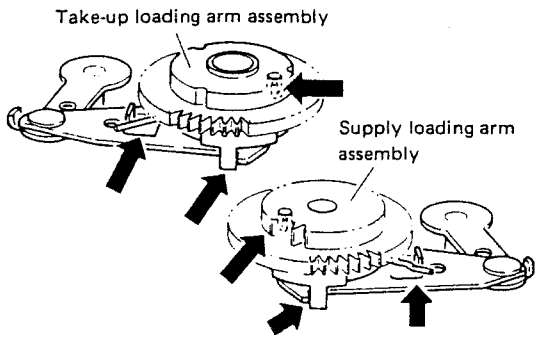


Fig. 1-6-1 Loading arm assembly (1)

2) The take-up and supply loading arm positions with respect to the loading gear holes are indicated in Fig. 1-6-2. This configuration is important to allow shifting to the next operation.

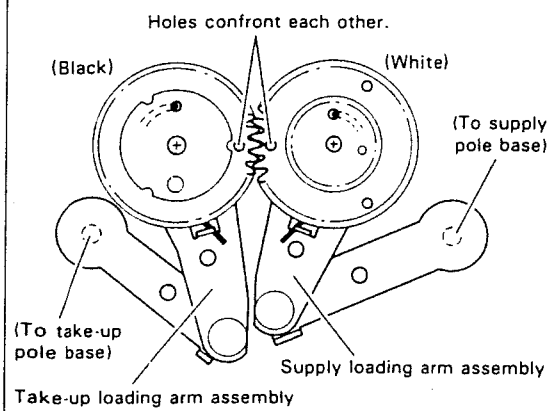


Fig. 1-6-2 Loading arm assembly (2)

No.	Item	Adjustment parts	Operating mode	Description
2	Control cam			1) Install the half loading cam on the cam bracket assembly, then mount the slide cam plate assembly so that its stud sets into the groove on the half loading cam. 2) Install the arm gear assembly on the cam bracket assembly. 3) Assemble the second gear and the control cam so that the stud of the control cam sets into the hole of the second gear. 4) Mount the above assembly (control cam and second gear) on the cam bracket assembly to satisfy the relation indicated in figure. 5) Do not turn the control cam from this position for the next step.
3	Cam bracket assembly			1) Refer to Fig. 1-6-5 and press the plate assembly toward the right to overlap the indicated hole with that of the main deck. 2) Then install the cam bracket assembly. **Note:** If the arm and loading gears do not mesh properly, use a jeweler's screwdriver or similar tool to engage the gear teeth while installing the cam bracket assembly.
4	Mode switch position			1) Engage the plate assembly and mode switch as shown in Fig. 1-3-5. Partially tighten screw (1) to where the switch can still be shifted for adjusting the position. 2) Press the plate assembly toward the right to where the holes are overlapped as in Fig. 1-6-5. Insert a jeweler's screwdriver into the holes to keep them aligned. 3) Shift the mode switch to align the V-notch as indicated in Fig. 1-6-6. Then tighten screw (1) to secure. 4) Remove the jeweler's screwdriver, then reinstall and solder the circuit board.

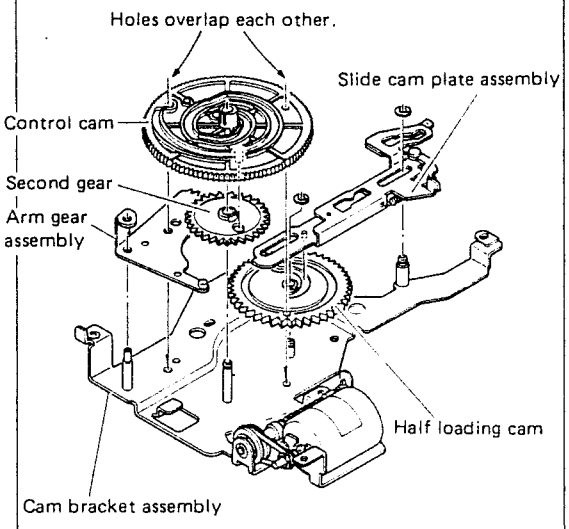


Fig. 1-6-3 Control cam

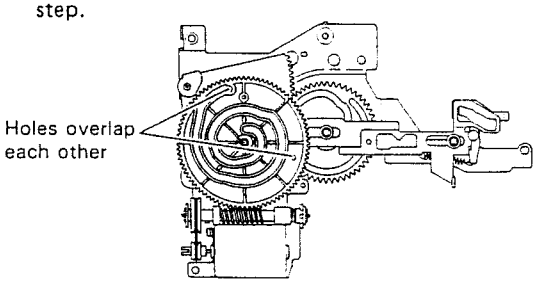


Fig. 1-6-4

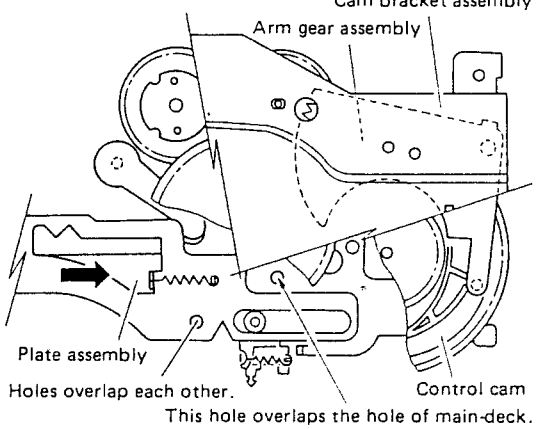


Fig. 1-6-5 Cam bracket assembly

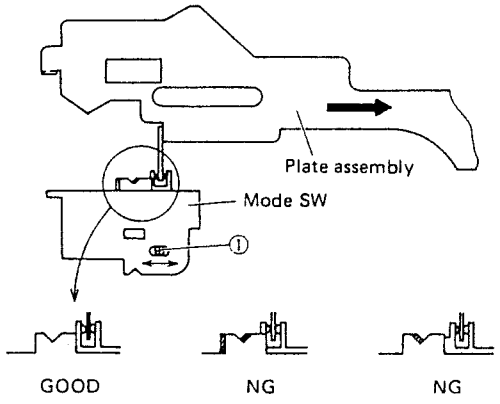


Fig. 1-6-6 Mode switch

1.7 CONFIRMATION AND ADJUSTMENT

No.	Item	Adjustment parts	Operating mode	Description
1	Tension pole position			1) Without a cassette tape, set for the Play mode (see Section 1.2). 2) Refer to Fig. 1-7-1. Slightly loosen screw (1). Adjust the tension band holder position for 0 mm separation between A and B. 3) Tighten screw (1) to secure the tension band holder. 4) Use the back tension cassette gauge and set for the Play mode. 5) Check for a scale reading between 25 and 45. 6) If outside this range, clean the tension band contacting portions of the supply reel disk with alcohol, or check the condition of the tension arm spring. If necessary, replace the tension band assembly.
2	Take-up torque			1) Without a cassette tape, set for the Play mode (see Section 1.2). 2) Set the torque gauge on the take-up reel disk. 3) Grasp the torque gauge lightly so that it rotates and read the value when the scale matches the indicator needle. Confirm a value between 45 and 155. 4) If outside this range, clean the rubber portion of the idler arm with alcohol, or if necessary, check the reel motor drive circuit.

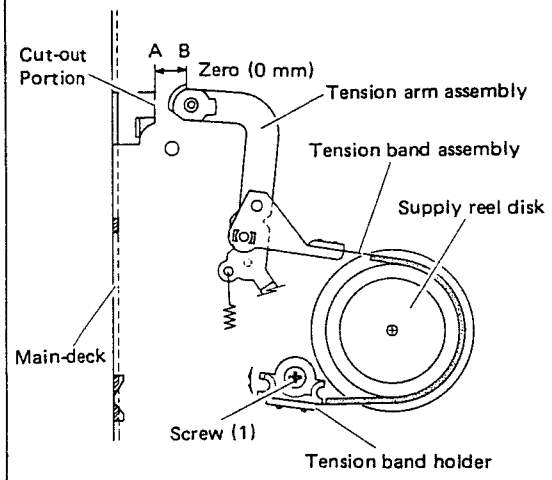


Fig. 1-7-1 Tension pole position

1.8 TAPE TRANSPORT CHECKS AND ADJUSTMENT PREPARATIONS

No.	Item	Adjustment parts	Operating mode	Description
	The tape transport system has been precision-adjusted at the factory and ordinarily does not require readjustment. However, adjustment may become necessary after long term usage or after replacing parts that affect the tape transport. The following steps mainly cover preparations for the interchangeability adjustments of Section 1.9.			
1	Guide roller			1) During interchangeability adjustments, the guide roller is turned with a flat-blade screwdriver to adjust its height and correct FM waveform linearity. Use a metric hex key (1.25 mm) to slightly loosen the setscrew at the base of the guide roller (see Fig. 1-8-1). Loosen the setscrew just sufficiently to allow the guide roller to be turned. If too loose, tape transport will be too unstable to permit correct adjustment.
2	Impedance roller			1) This compensates for tape running stability between the cassette and head drum. After adjusting the supply guide roller, the impedance roller height is adjusted for smooth tape transport at the lower flange. 2) Use a metric nutdriver (5.5 mm) to adjust by turning the upper nut (see Fig. 1-8-2). However, note that excess turning can disturb the FM waveform stability.
3	A/C head (audio/control head)			1) After adjusting the take-up guide roller, adjust the A/C head inclination for smooth tape travel at the lower flange of the take-up guide pole. Refer to Fig. 1-8-3.

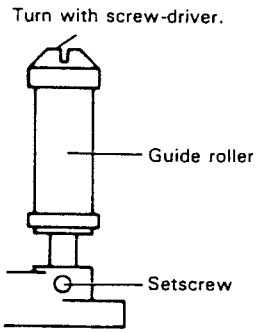


Fig. 1-8-1 Guide roller

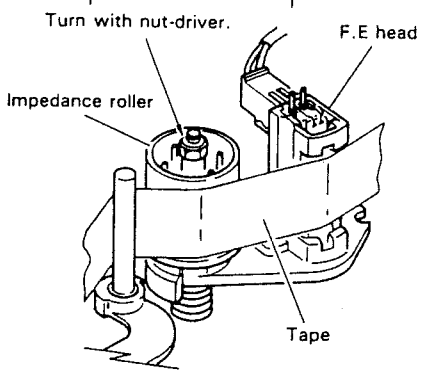


Fig. 1-8-2 Impedance roller

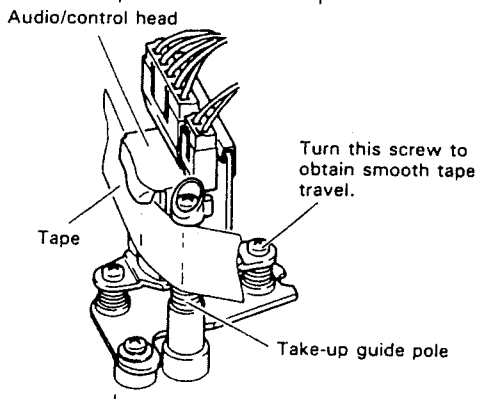
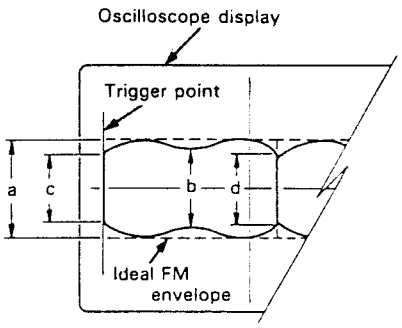
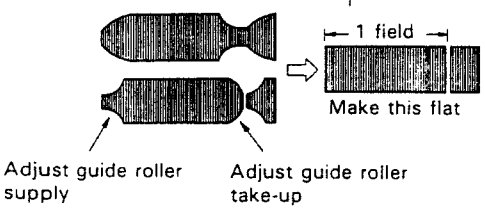
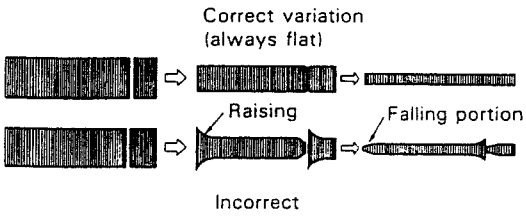
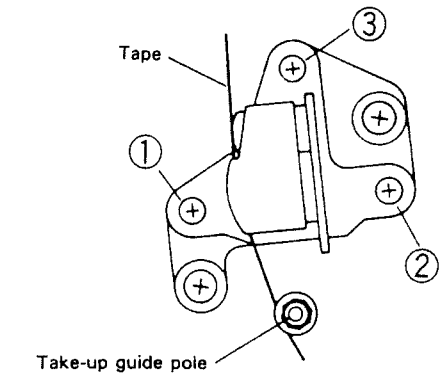
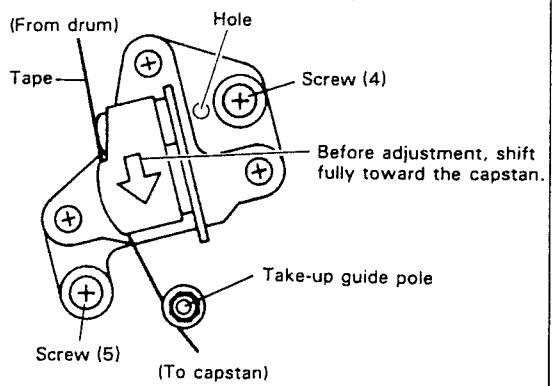


Fig. 1-8-3 A/C head

1.9 INTERCHANGEABILITY CHECKS AND ADJUSTMENTS

No.	Item	Adjustment parts	Operating mode	Description
1	Before using costly Alignment tape, use a spare tape and confirm correct operation of the tape transport. If this adjustment is performed, after turning off the indicator by pressing the + and − tracking button, perform interchangeability adjustment.			
	FM waveform			1) Connect oscilloscope to the FM OUT testpoint of the video playback circuit. Trigger the oscilloscope externally with the signal from the drum flipflop (D-FF or FF) testpoint. Set the trigger slope to minus (−).
	$\frac{b}{a} \geqq 0.7$, $\frac{c}{a} \geqq 0.5$ and $\frac{d}{a} \geqq 0.5$			2) Play the MH-2 Alignment tape and adjust the tracking for maximum FM waveform output. Refer to Fig. 1-9-1. Confirm the relationships indicated in the figure for maximum output (a), minimum center output (b), minimum output at the drum intake (c) and minimum output at the drum output (d).
	 Fig. 1-9-1 FM envelope			3) Adjustment is required if the above specifications are not fulfilled. Even when these are fulfilled, check that the FM waveform varies linearly overall. If not, slight deviation in tracking will cause a large proportional level drop to result in noise appearing in the picture. Therefore, in this condition, proceed to the following checks and perform adjustments where necessary.
	 Fig. 1-9-2 Tape pattern adjustment-1			4) Operate the tracking adjustment between minimum and maximum outputs of the FM waveform. Observe the portion of the waveform corresponding to the drum intake (see Fig. 1-9-2). As the tracking is adjusted, although the gain may increase or decrease, the geometric shape of this part of the waveform should remain consistent. If the shape varies, as shown by the incorrect examples in the figure, carefully perform adjustment of the supply guide roller height.
	 Fig. 1-9-3 Tape pattern adjustment-2			5) Next observe the portion of the waveform corresponding to the drum output (see Fig. 1-9-2), while operating the tracking adjustment. This should also vary only in gain, but not in shape. If the shape varies, as shown by the incorrect examples in the figure, carefully perform adjustment of the take-up guide roller height.
				6) Check the overall FM waveform. Fine-adjust both guide rollers so that variation is as minimum and linear as possible.
				7) Observe the tape travel at the guide rollers and guide poles. Confirm absence of tape creasing or curling. Confirm that the tape properly rides at the lower flange of the supply guide pole. Carefully adjust the guide pole height if necessary. This adjustment is important and affects FM waveform response. If creasing or curling is observed at the take-up guide pole, carefully adjust the audio/control head inclination so that the tape rides properly at the lower flange of the guide pole. Finally, again check the FM waveform.

No.	Item	Adjustment parts	Operating mode	Description
	Proper adjustment of the A/C head position is important for ensuring adequate audio output and S/N. Severe misalignment can prevent control signal pick-up and cause servo instability. Precise adjustment is particularly important for models that include tape indexing and addressing features, since these rely on control signal coding for operation. To observe the audio signal, connect an oscilloscope to the test point (AUDIO OUT) of the audio circuit, or directly to the audio output terminal. In some cases, monitoring the sound with headphones may be helpful.			
2	A/C head adjustments  Audio signal Fig. 1-9-4 A/C head			1) Play the stairstep (audio 6 kHz) portion of the MH-2 Alignment tape. 2) Adjust screw (3) (Fig. 1-9-4), which is the azimuth adjustment, for maximum output. 3) Turn screws (1), (2) and (3) by small and equal increments (about 45° at a time) to adjust the A/C head height for maximum audio output. Slightly raise and lower the height to confirm the maximum output position. 4) Observe the FM waveform and tighten the guide roller setscrews. Use care not to disturb the height adjustments. Then again confirm the FM waveform.
	This determines the distance between the sound and picture information on the tape. Correct adjustment is important for providing synchronization of picture and sound in the program. Incorrect adjustment is particularly noticeable in the slow speed (LP) mode. Observe the FM waveform by connecting an oscilloscope to the video play-back circuit test point (FM OUT). Trigger the oscilloscope externally with the drum flipflop signal. Use plus (+) trigger to view the CH-2 waveform. Set the tracking adjustment to the neutral (AUTO) position. (Turn off the indicator by pressing the + and − tracking buttons simultaneously)			
3	Control head phase (X value)  Fig. 1-9-5 Control head phase			1) Play the stairstep portion of the MH-2 Alignment tape. 2) See Fig. 1-9-5. Slightly loosen screws (4) and (5). Set the A/C head positioning tool over screw (4) with the pin of the tool inserted into the indicated hole. 3) Turn the tool counterclockwise to shift the A/C head fully toward the capstan direction. 4) While observing the CH-2 FM waveform, gradually turn the tool clockwise. Stop at the peak output position and tighten screw (5). Remove the tool and tighten screw (4). 5) Replace alignment tape MH-2L with MH-2, play back the stairstep segment of the alignment tape MH-2L. 6) Operate the tracking adjustment and confirm that the maximum FM waveform is obtained at the neutral setting. 7) If the FM output peak is not obtained at tracking neutral position, shift the A/C head at the FM output peak nearest to this position.

No.	Item	Adjustment parts	Operating mode	Description
4	Final checks			1) Supply a video or TV signal (monochrome is preferable). Use a spare tape and record and play back. Confirm that the play-back FM signal conforms to the parameters indicated in Fig. 1-9-1. Check for both SP and LP modes. 2) Connect the oscilloscope to the test point (FM OUT) of the FM audio play-back circuit. Play the stairstep portion (which includes the FM audio carrier) of the MH-2L Alignment tape. Confirm absence of severe drop in FM waveform level. 3) Perform the checks and, if necessary adjustments, of the Electrical Adjustments Section for the servo, video and audio (and FM audio) circuits.

2.2 CIRCUIT BOARD LOCATION

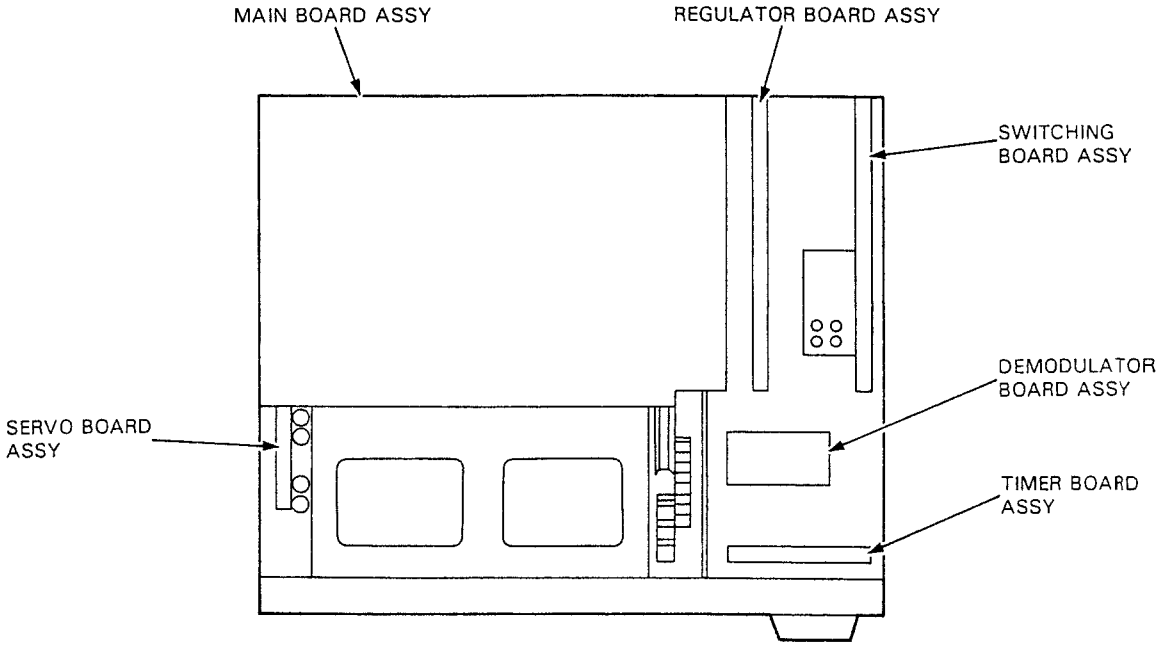


Fig. 2-2-1

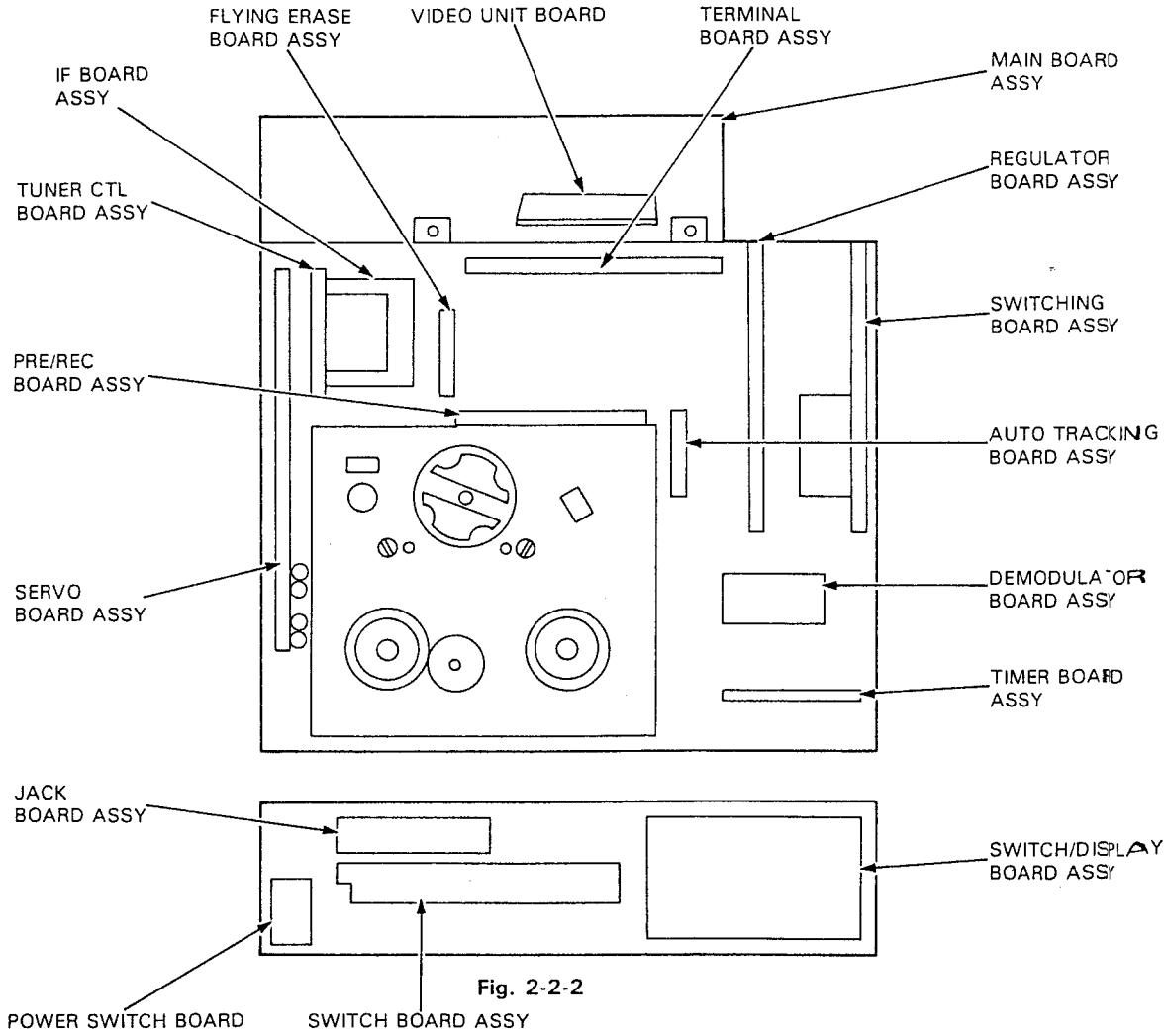


Fig. 2-2-2

2.3 SWITCHING REGULATOR CIRCUIT

Notes: *Unless otherwise specified, all test points and adjustments are located on the SWITCHING REGULATOR board.*

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
1	5 V DC output voltage	TP1	R26	• REC • TUNER	1) Connect a digital voltmeter between TP1 and TP-GND. 2) Record in the TUNER mode, and adjust R26 for 5.345 ±0.05 V.
2	Semi-REG 15 V output voltage	CN3 pin 7	R9	• REC • TUNER	1) Connect a digital voltmeter between CN3 pin 7 and TP-GND. 2) Record in the TUNER mode, and adjust R9 for 15.2±0.2 V.

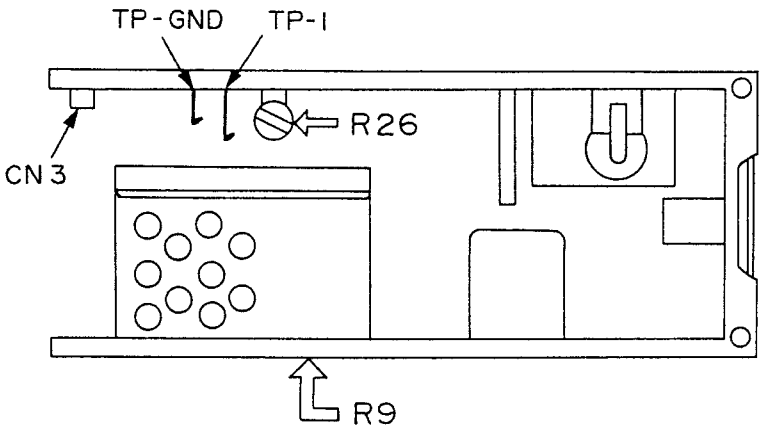


Fig. 2-3-1

2.4 TIMER CIRCUIT

Notes: *Unless otherwise specified, all test points and adjustments are located on the TIMER board.*

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
1	Timer clock	TP2 TP1 (GND)	C10	• E-E	1) Connect a frequency counter between TP2 and GND. 2) Short between TP3 (TEST) and GND, then short the leads of electrolytic capacitor C8 once in order to reset IC1. 3) Adjust C10 for 2048.000 ±0.002 Hz (488.2808 to 488.2818 μs).

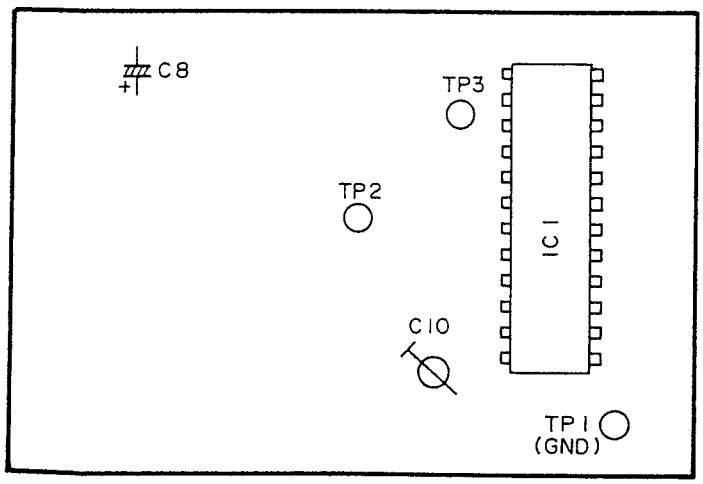


Fig. 2-4-1

2.5 SERVO CIRCUIT

Notes: *Unless otherwise specified, all test points and adjustments are located on the SERVO board.*

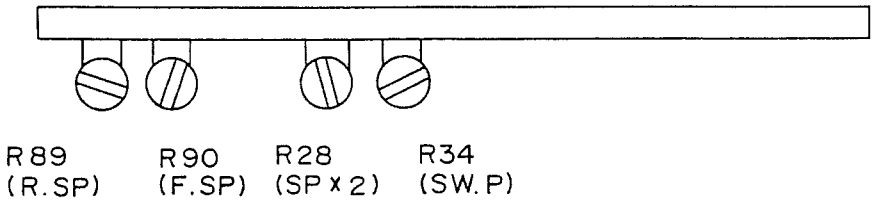


Fig. 2-5-1

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
1	SP PB switching point	VIDEO OUT or TP210	R34 (SW. P)	• PB • MH-2 (stairstep) • Trigger slope (–) • SP mode • AUTO TRACKING OFF	1) Connect an oscilloscope to VIDEO OUT. 2) Play back the stairstep segment of MH-2 alignment tape. 3) Trigger the oscilloscope externally (– slope) with the signal from TP211 of the MAIN board assy. 4) Adjust R34 to position the trigger point 6.5 ±0.5 H from V. sync.
2	SP slow tracking preset	Monitor	R90 (FWD. SP) R89 (REV. SP)	• SP mode • Colour bar or Tuner • REC then slow PB	1) Record a colour bar signal in the SP mode, then play back the recorded colour bar in the Slow mode. 2) Adjust R90 for FWD direction and R89 for REV direction to minimize noise bars on the video monitor screen.
3	SP ×2 tracking preset	Minitor	R28 (SP×2)	• SP mode • Colour bar or Tuner • REC then ×2 play	1) Record a colour bar signal in the SP mode, the play back the recorded colour bar in the ×2 play mode. 2) Adjust R28 to minimize noise bars on the video monitor screen.

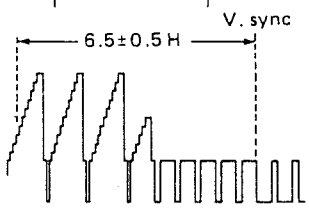


Fig. 2-5-2

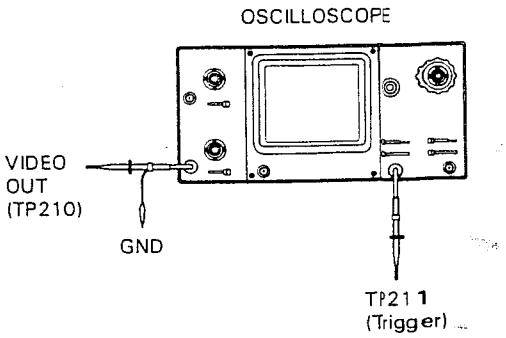


Fig. 2-5-3

2.6 VIDEO CIRCUIT

Notes: ***Unless otherwise specified, all test points and adjustments are located on the MAIN board.***

<table>
<tr><th>No.</th><th>Item</th><th>Check Point</th><th>Adjustment Parts</th><th>Signal & Mode</th><th>Description</th></tr>
<tr><td>1</td><td>SP REC colour level and balance</td><td>IC201-19 (VIDEO UNIT)</td><td>R232 (SP REC COL.)</td><td>• PB mode
• MH-2 colour bar

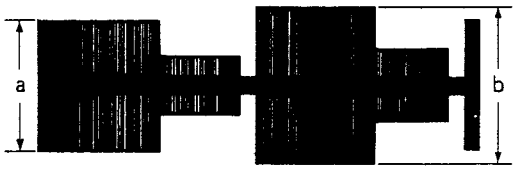
• REC then PB
• Colour bar
• SP mode
• AUTO TRACKING OFF</td><td>1) Connect an oscilloscope to IC201-19 of the VIDEO UNIT board. Play back a colour bar segment of the MH-2 and observe colour signal level.
2) Adjust by pressing the + and – tracking buttons of the FRONT panel for maximum level of the colour waveform and make a note of the higher colour level.
3) Record and play back a colour bar signal. If necessary, before recording, adjust R232 so that the higher level channel becomes 90% of the noted level during play back. At this time, confirm that the channel difference is within 3 dB.
 

Fig. 2-6-2</td></tr>
<tr><td>2</td><td>LP REC colour level and balance</td><td>IC201-19 (VIDEO UNIT)</td><td>R234 (LP REC COL.)</td><td>• PB mode
• LP mode
• MH-2L colour bar

• REC then PB
• Colour bar
• LP mode
• AUTO TRACKING OFF</td><td>Note: Perform the LP mode adjustment after completing that for the SP mode.
1) Connect an oscilloscope to IC201-19 of the VIDEO UNIT board. Play back a colour bar segment of the MH-2L and observe colour signal level.
2) Adjust by pressing the + and – tracking buttons of the Front panel for maximum level of the colour and make a note of the higher colour level.
3) Record and play back a colour bar signal. If necessary, before recording, adjust R234 so that the higher level channel becomes 90% of the noted level during play back.
At this time, confirm that the channel difference is within 3 dB.</td></tr>
</table>

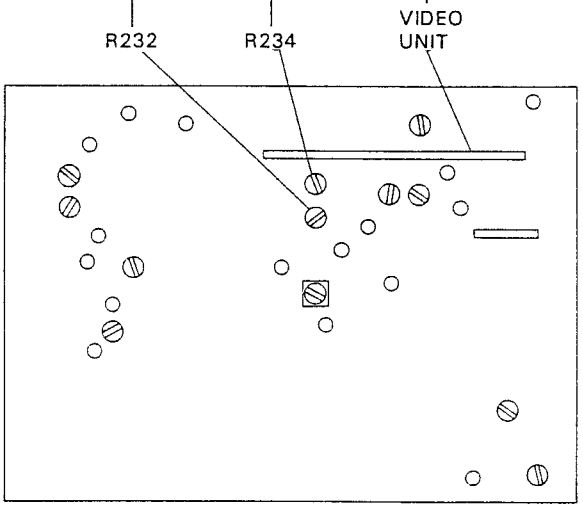


Fig. 2-6-1

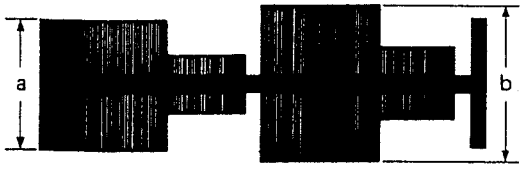


Fig. 2-6-2

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
3	Noise cancel balance	TP21 (VIDEO UNIT board)	R16 (VIDEO UNIT board)	• Colour bar • E-E • AUX	1) Supply a colour bar signal and connect an oscilloscope to TP21. 2) As indicated in the figure, adjust R16 for minimum DC step difference.
4	SP mode frequency response and balance	TP210	R239	• SP mode • Video sweep • REC then PB • AUTO TRACKING OFF	1) Terminate VIDEO OUT with a 75 Ω load and set the SHARPNESS control to the centre detent position. 2) Connect a video sweep generator to VIDEO IN and an oscilloscope to TP210. 3) Record and play back a video sweep signal in the SP mode. Use the control of the oscilloscope to position the 100 kHz region at graduation 3 of the oscilloscope scale. 4) Adjust R239 to position 2 MHz of CH-1 portion at 2.4~3.0 (−1±1 dB) of the oscilloscope graduations as shown in Fig. 2-6-5. 5) Confirm that the channel difference is within 2 dB.

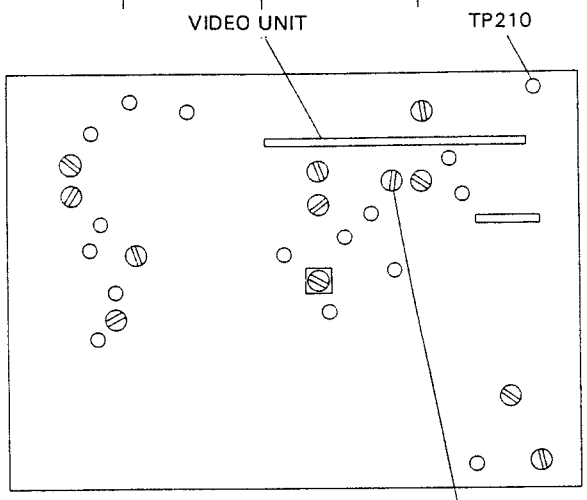


Fig. 2-6-3

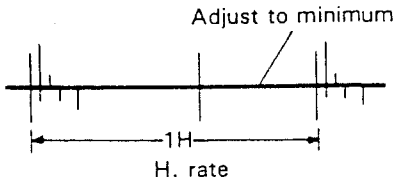


Fig. 2-6-4 YNR edge noise

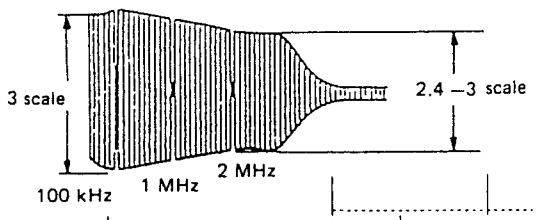


Fig. 2-6-5

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
5	LP mode frequency response and balance	TP210	R242	• LP mode • Video sweep • REC then PB • AUTO TRACKING OFF	1) In the same manner as above (2.6.4) perform adjustment for LP mode. 2) Record and play back a video sweep signal in the LP mode. Use the control of the oscilloscope to position the 100 kHz region at graduation 3 of the oscilloscope scale. 3) Adjust R242 to position 2 MHz of CH-1 portion at 1.5~1.8 (−5±1 dB) of the oscilloscope graduations. 4) Confirm that the channel difference is within 2 dB.
		Monitor	R239 (SP) R242 (LP)	• SP and LP modes • REC then PB • TV broadcast • AUTO TRACKING OFF	**Alternate method** 1) Record and play back a colour broadcast that shows a good depiction of human facial contours. 2) Adjust R239 (SP mode) and R242 (LP mode) to obtain distinct facial features on the monitor. **Note:** ***R239 and R242 nearly at centre position.***

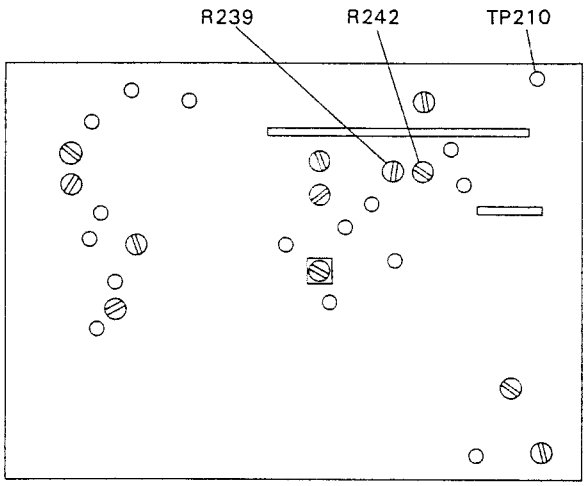


Fig. 2-6-6

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
6	0.5 H delayed video level	TP210	R9 (Incl. IC 202)	• Colour bar • LP mode • REC then PB ↓ • SEARCH FF	1) Connect an oscilloscope to VIDEO OUT or TP210 and set the time base of the oscilloscope to 2 ms/div. Trigger the oscilloscope externally (– slope) with the from TP211 (DRUM FF). 2) During search, adjust R223 so that the Y level difference is uniform at VIDEO OUT as shown in Fig. 2-6-8.
7	APC error phase	TP216 TP232	LC201	• MH-2 colour bar • SP mode • PB	1) Connect one channel of a dual trase oscilloscope to TP216 and the other channel to TP232. Trigger the oscilloscope externally (– slope) with the signal from TP212. 2) Set the oscilloscope for ALT mode. 3) Adjust LC201 to position the zero-cross 30 μsec ±3 μsec from the centre of the burst signal as shown in Fig. 2-6-9.

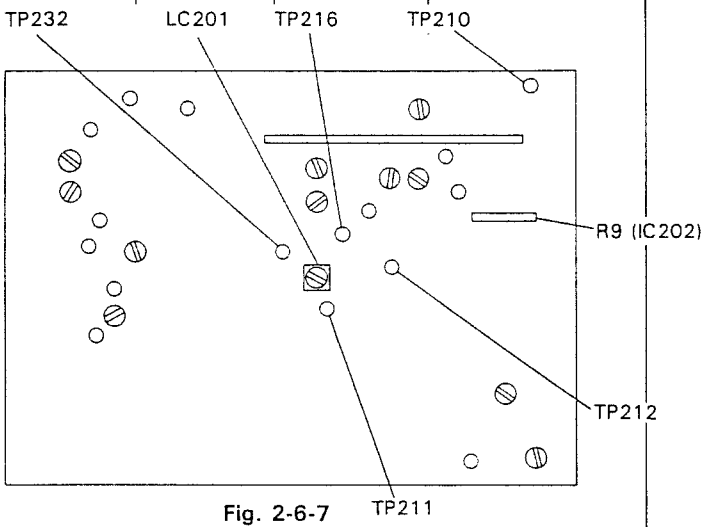


Fig. 2-6-7

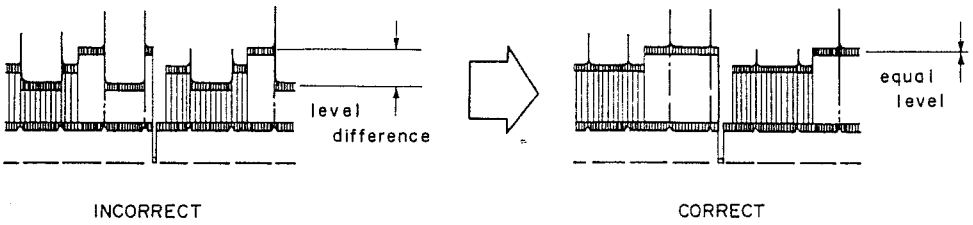


Fig. 2-6-8

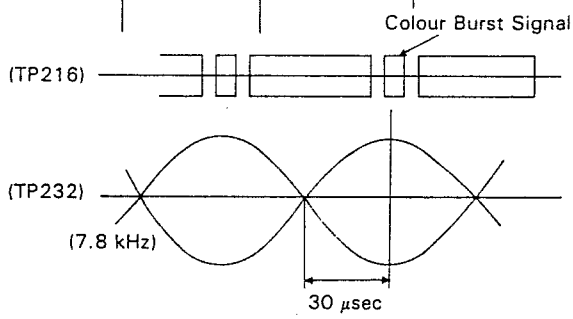


Fig. 2-6-9

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
8	Fader timing (1)	TP210 TP251	R287 (H. ADJ)	• SP mode • REC • Colour bar	1) Connect one channel of a dual trace oscilloscope to TP210 and the other channel to TP251. 2) Set the oscilloscope for ALT mode. 3) Use the controls of the oscilloscope to expand portion H sync as shown in Fig. 2-6-11. 4) Adjust R287 for 6.5±0.5 μsec of "T" as shown in Fig. 2-6-11.
9	Fader timing (2)	TP210 TP251	R288 (V. ADJ)	• SP mode • REC • Colour bar	1) Connect one channel of a dual trace oscilloscope to TP210 and the other channel to TP251. 2) Trigger the oscilloscope externally (– slope) with the signal from TP211 of the MAIN board. 3) Set the oscilloscope for ALT mode. 4) Adjust R288 for 6±1 H of "T" as shown in Fig. 2-6-12.
10	SECAM DET.	IC251-18 (VIDEO UNIT board)	LC251 (VIDEO UNIT board)	• E-E • SECAM colour bar	1) Connect an oscilloscope to pin 18 of IC251. 2) Adjust LC251 so that A and B are retated as follows: A : B = 3 : 4

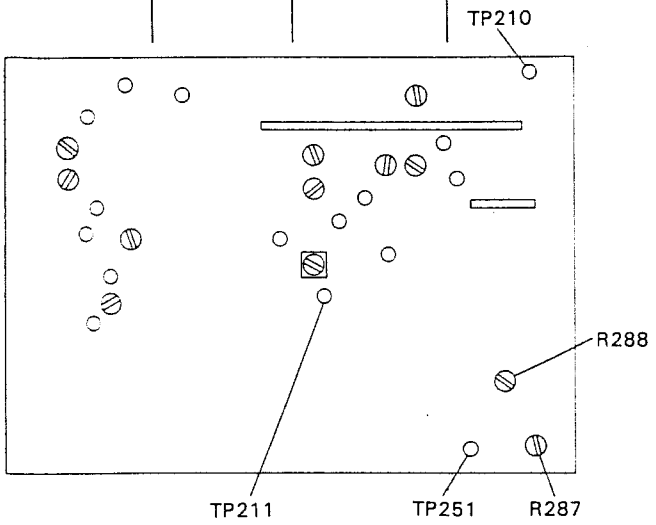


Fig. 2-6-10

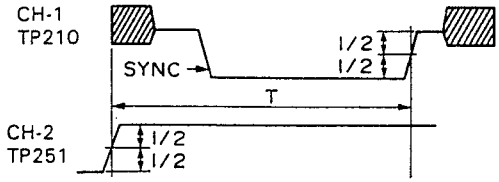


Fig. 2-6-11

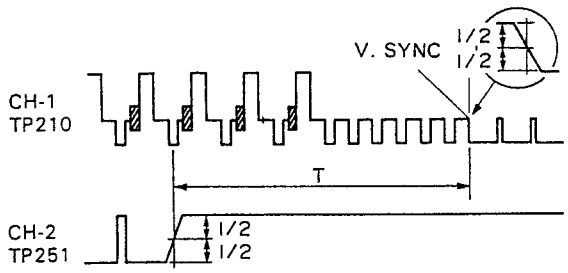


Fig. 2-6-12

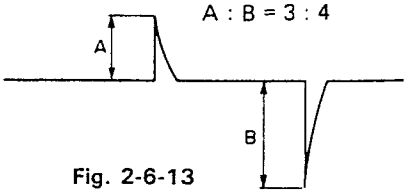


Fig. 2-6-13

2.7 AUDIO CIRCUIT

Note: ***Unless otherwise specified, all test points and adjustments are located on the MAIN board.***

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
1	Audio bias level	TP31 TP32	R9 (BIAS ADJ)	• SOURCE Select : AUX • SP mode • NO signal	1) Connect a millivoltmeter between TP31 and TP32. 2) Set for REC mode without signal. 3) Adjust R9 for 2.2 mVrms.
2	E-E level	AUDIO OUT	R40 (E-E ADJ)	• SOURCE Select : SIMUL • ALC: OFF • E-E mode • AUDIO monitor to Hi-Fi	1) Connect an audio tester to AUDIO OUT. 2) Supply a 1 khz, −8 dBs audio signal to AUDIO IN. 3) Set Hi-Fi REC level and Balance Controls to centre position. 4) In the REC mode, adjust R40 to obtain −6±0.5 dBs at AUDIO OUT.

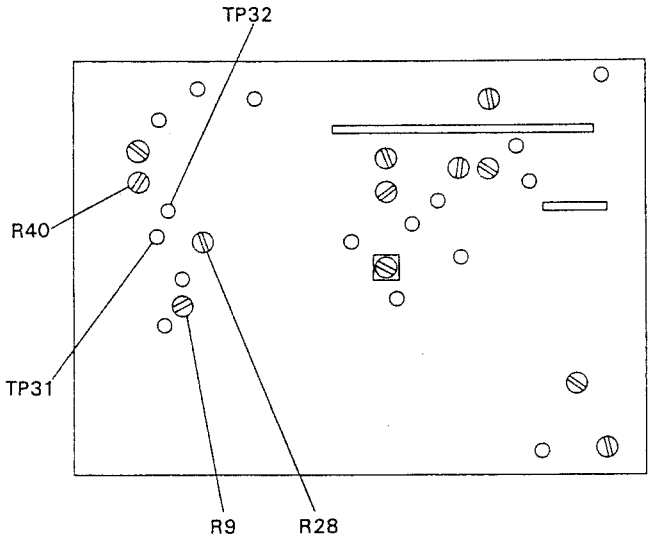


Fig. 2-7-1

2.8 TUNER/IF CIRCUIT

Note: *Unless otherwise specified, all test points and adjustments are located on the TUNER/IF board.*

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
	Equipment required: 1. Oscilloscope 2. IF sweep signal generator with suitable markers (PIF, etc.) 3. Sweeper probe (sweep signal supply cable) as shown below.				

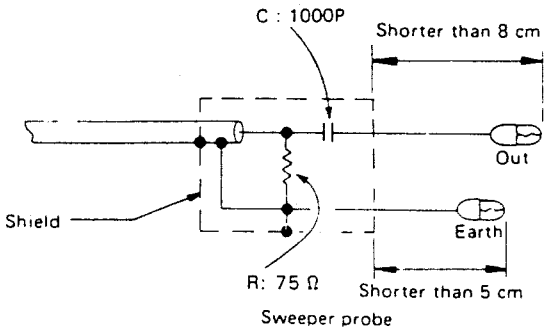
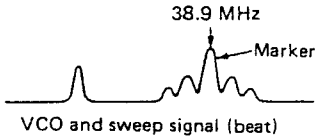


Fig. 2-8-1

1	VCO	IC1-28	T2 (VCO)	• Sweep generator out: 70 dBμ (38.9 MHz) • Tuner mode without antenna IN	1) Use a sweeper probe as shown in Fig. 2-8-1 and connect the sweep generator output to pin 1 of SAW1. Adjust the sweep gain so that the waveform does not distort as observed with the oscilloscope. Connect the oscilloscope to pin 28 of IC1 (VIDEO DET OUT) and adjust T2 to align the waveform with the frequency marker as shown in Fig. 2-8-2.
				• TV broadcast • Tuner mode	**Alternate method:** 1) Receive a colour broadcast on a VHF-HI channel (7 to 13). 2) Adjust T2 to obtain a fine picture on the monitor.



VCO and sweep signal (beat)

Fig. 2-8-2

- **Before the following adjustments:**

1. Connect a cable to ANT IN and terminate TV OUT at 75 Ω.
2. Set a TV channel signal generator as follows.

Video : 65 dBμ/75 Ω, colour bar 87.5% modulation Audio : 55 dBμ/75 Ω, 1 kHz ± 50 kHz deviation

2	RF AGC	IF terminal of Front end	R21	• TV signal • Tuner mode	1) Connect the oscilloscope to IF terminal of U/V Tuner (Front end). Adjust R21 for maximum level, then again adjust R21 for – 10 dB gain.
		MONITOR	R21	• TV broadcast • Tuner mode	**Alternate method:** Note: ***Adjust R21 (RF AGC) to correct for excess noise in the picture or when streaky cross interference occurs due to strong electrical fields.*** 1) Adjust R21 to minimize noise or streaks on the TV screen. 2) Check for absence of abnormality on all channels.

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
3	Colour Level	JP1-12 (VIDEO OUT)	R40	• TV signal • Tuner mode • Colour bar	1) Receiving a colour bar signal. Set the Y level for 100% reference signal and then adjust R40 for a magenta level of 48% at pin 4 of CN1.

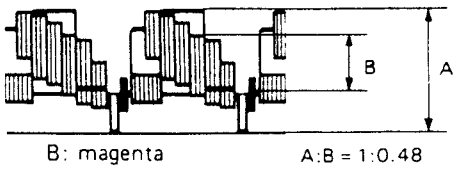


Fig. 2-8-3

2.9 DEMODULATOR CIRCUIT

Note: *Unless otherwise specified, all test points and adjustments are located on the DEMODULATOR board.*

Audio Multiplex TV Signal Generator

Recommanded Specifications

1. Signal Format — Based on CCIR-B
2. Frequency
   - Video Carrier FV — 38.9 MHz
   - 1st Sound Carrier fs_1 — 33.4 MHz
   - 2nd Sound Carrier fs_2 — 33.1578125 MHz
3. Modulator
   - Video — Crosshatch (black on white) V: 50 Hz, H: 15.625 kHz
   - Audio — Sinewave 1 kHz; CH1 and CH-2 outputs switchable
4. Output — 97 dB/μV (open)±2 dB fixed, BNC-R 75 Ω
5. P-S Ratio — S_1 P−13 dB±2 fixed; S_2 P−20 dB±2 fixed
6. Modulation
   - Video — 87.5%±3%
   - Audio — ±30 kHz±2 kHz
7. Stereo Separation — Less than −40 dB
8. Pilot Signal
   - Carrier Frequency — 54.6875 kHz±5 Hz synchronized type
   - Stereo — 117.5 Hz AM 50%
   - Dual — 274.1 Hz AM 50%

9. Sound Modulation Modes	S_1	S_2
Mono	Mono 1	Mono 2
Stereo	(L+R)/2	R
Dual	Mono 1	Mono 2

10. Functions	S_1	S_2
Mono (M)	100%	100%
Stereo (L, R)	(L+R)/2	R
(L)	L/2	—
(R)	R/2	R
(OFF)	—	—
Mult (S_1, S_2)	100%	100%
(S_1)	100%	0
(S_2)	0	100%
(OFF)	0	0

V. MOD (ON/OFF)

11. Frequency Accuracy — Within $\pm 5 \times 10^{-5}$
12. Spurious — Less than −50 dB
13. Saw Filter — Self-contained

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
	Equipment required: 1. Oscilloscope 2. Audio Multiplex TV Signal Generator 3. Sweeper probe (sweep signal supply cable) as shown below.				

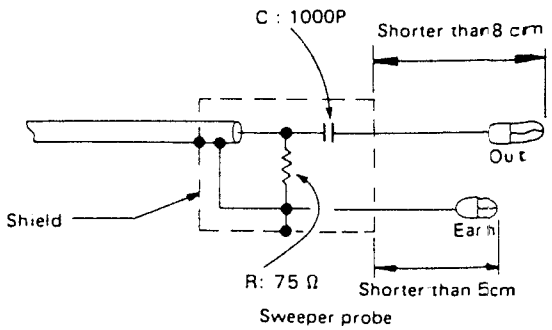
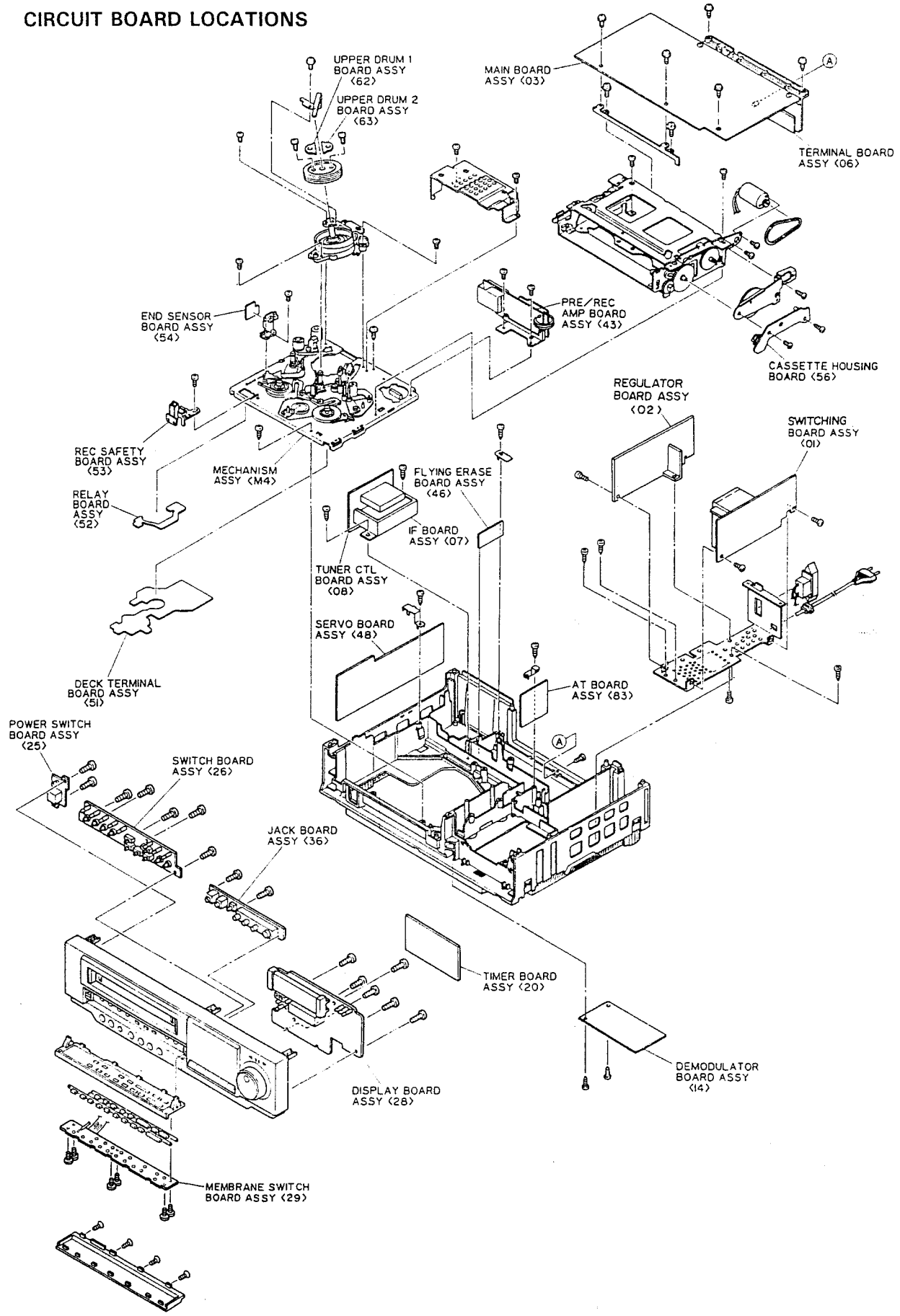


Fig. 2-9-1

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
1	First audio detector coil	IC1 Pin 3	T4 [IF board]	• BILING mode • SUB: unmod. • MAIN: mod.	1) Use a sweeper probe as shown in Fig. 2-8-1 and apply Main audio modulated signal to the front end IF terminal. 2) Connect a distortion meter to IC1 pin 3. 3) Adjust T4 of the IF board for minimum distortion. **Note:** ***Audio multiplex TV signal generator connection is the same for the following adjustments.***
2	Second audio detector coil	IC1 pin 2	T1	• BILING mode • SUB: mod. • MAIN: unmod.	1) Connect a distortion meter to IC1 pin 2. 2) Adjust T1 for minimum distortion.
3	Stereo separation	IC1 pin 5	R2	• STEREO mode • R: mod. • L: unmod.	1) Set a signal generator to Stero mode, but adjust only the R channel. 2) Connect an oscilloscope to IC1 pin 5. 3) Adjust R2 for minimum output level.
4	Buzz	CN2 pin 2	T8, T2 [IF board]	• STEREO mode • R/L: unmod.	1) Connect a noise meter to CN2 pin 2 and an oscilloscope to AC output of the noise meter. 2) Adjust T8 of the IF board for minimum Philips pattern noise. 3) Adjust T2 of the IF board for minimum crosshatch noise.
5	Audio output level	CN2 pin 2 (L) CN2 pin 4 (R)	R21(L) R24(R)	• STEREO mode • R: mod./unmod. • L: unmod./mod.	1) Set a signal generator for Stereo mode. 2) Connect a noise meter to CN2 pin 2. 3) Adjust R21 (L channel) for -14.0 ± 0.5 dBs. 4) Similarly, connect a noise meter to pin 4 of CN2 and adjust R24 for the R channel.

SECTION 3
CHARTS AND DIAGRAMS

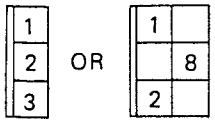
3.1 CIRCUIT BOARD LOCATIONS


UPPER DRUM 1 BOARD ASSY (62)
UPPER DRUM 2 BOARD ASSY (63)
MAIN BOARD ASSY (03)
TERMINAL BOARD ASSY (06)
END SENSOR BOARD ASSY (54)
PRE/REC AMP BOARD ASSY (43)
CASSETTE HOUSING BOARD (56)
REGULATOR BOARD ASSY (02)
SWITCHING BOARD ASSY (01)
REC SAFETY BOARD ASSY (53)
MECHANISM ASSY (M4)
FLYING ERASE BOARD ASSY (46)
RELAY BOARD ASSY (52)
IF BOARD ASSY (07)
TUNER CTL BOARD ASSY (08)
SERVO BOARD ASSY (48)
DECK TERMINAL BOARD ASSY (51)
AT BOARD ASSY (83)
POWER SWITCH BOARD ASSY (25)
SWITCH BOARD ASSY (26)
JACK BOARD ASSY (36)
TIMER BOARD ASSY (20)
DEMODULATOR BOARD ASSY (14)
DISPLAY BOARD ASSY (28)
MEMBRANE SWITCH BOARD ASSY (29)

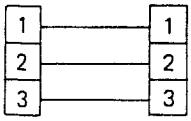
3.2 GENERAL INFORMATION

3.2.1 Connections

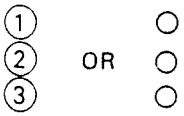
Note:
Unless otherwise specified, only signal input flow is indicated.
Connection arrows indicate only signal outputs.



: Connectors



: Board in connectors



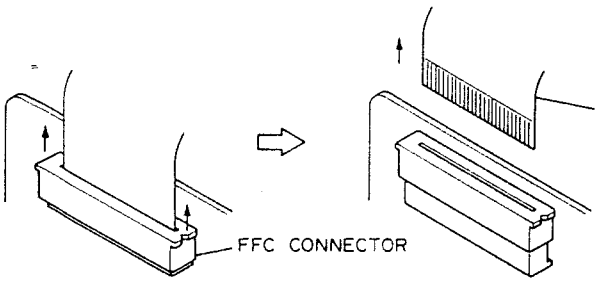
: Direct connections

: Connected pattern in the board.
Abbreviations
V : Video M : Mechacon
S : Servo A : Audio

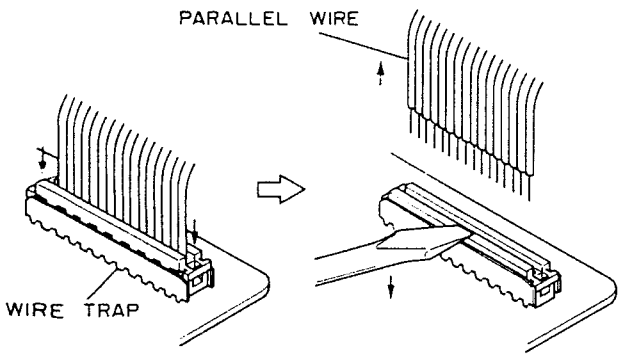
VS : Signal flow from video to servo.

3.2.2 Disconnecting the flatwire

1. Pull the connector structure upward to release the clamp when removing or inserting the flat wire cable.

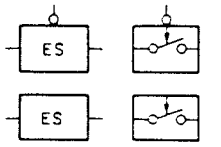


2. Depress the connector structure downward to release the clamp when removing or inserting the flat wire cable, as indicated below.



3.2.3 Indications

AUX : Active only at high.
$\overline{AUX}$: Active only at low.
$\bar{A}U\bar{X}$: Active only at middle.
$\bar{A}UX$: Active only at open.



: Active only at low for electronic switch.
: Active only at high for electronic switch.

: Low pass filter.

: High pass filter.

: Band pass filter.

: Limiter.

: Detector

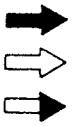
: Amplifier.

: Mixer stage.

3.2.4 Schematic diagram values

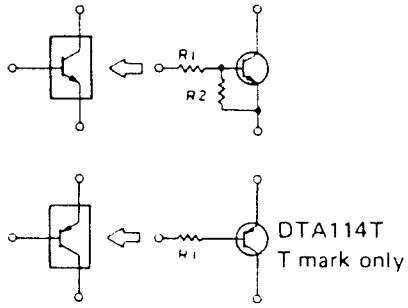
Unless otherwise specified.
1. All resistance values are in ohms, 1/6 W, 1/8 W, (refer to parts list).
2. All capacitance values are in μF, (P; PF).
3. All inductance values are in μH, (m; mH).
4. All diodes are 1SS133 or MA165, (refer to parts list).
5. Voltages are DC-measured (reference to ground) with a digital voltmeter during recording (SP mode) and playback (SP mode) with alignment tape. Where voltages differ between recording and playback, the voltage during playback is shown in parentheses.
6. Waveforms (VIDEO System) are measured (reference to ground) with a color bar during recording (SP mode) and playback (SP mode) with alignment tape.
7. Waveforms (AUDIO System) are measured (reference to ground) with 1 kHz (−8 dBs) during recording and playback with alignment tape (1 kHz).
8. Shaded ( ) parts are critical for safety. Replace only with specified parts numbers.

3.2.5 Signal flow in the schematic

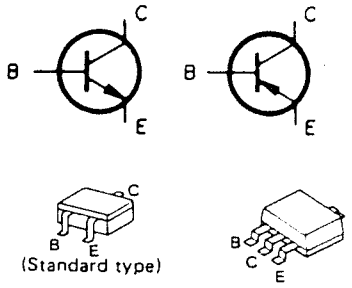

Recording signal path
Playback signal path
REC/PB signal path

3.2.6 Semiconductors

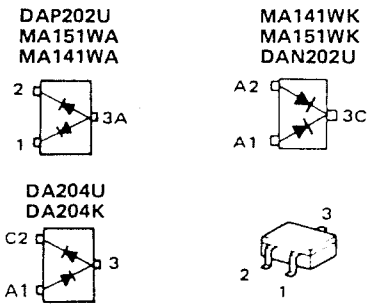
1. Digital transistor



2. Chip transistor



3. Chip diode



Note:
The digital transistor includes built in resistors.
It features small size and high reliability.
Both PNP and NPN types are available.

Uses:
Inverter, Interface, driver circuits.

3.2.7 Replacement of chip parts

For replacing chip parts, proceed it as follows.
Use a well insulated fine-tipped soldering iron (approx. 17 W, 130°C ~ 260°C in temp.).
In addition, it is recommended to use a soldering iron (55 W approx.) with solder absorber for convenience.

Caution:
- Do not apply heat for more than 3 seconds.
- Do not rub electrodes.
- Do not reuse chips once removed. Discard them
- Supplementary cementing is not required.

1. **Soldered condition of chip parts**

- Resistors, capacitors, etc.

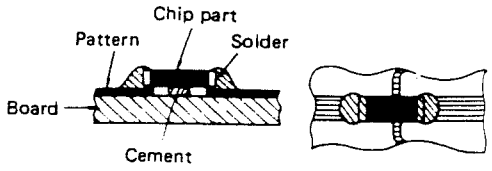


Fig. 3-2-1 Soldering condition-1

- Transistors, diodes, etc.

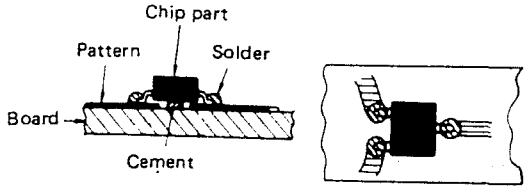


Fig. 3-2-2 Soldering condition-2

2. **How to remove chip parts**

- Resistors, capacitors, etc.

1) Set a chip parts replacing tool onto the chip parts to hold it down.
2) Unsolder at a side of the chip parts.

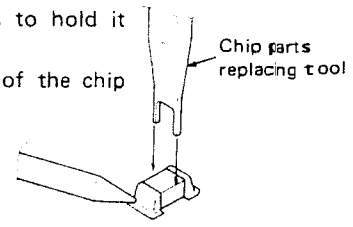


Fig. 3-2-3 R/C removal-1

3) Remove the chip parts by twisting and sliding it.

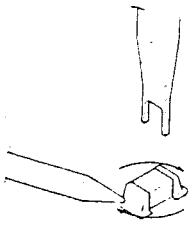


Fig. 3-2-4 R/C removal-2

3. How to remove transistors, diode.

1) Unsolder at the one-lead side of the chip parts.

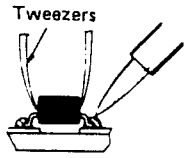


Fig. 3-2-5 Tr/Diode removal-1

2) Lift the unsoldered side upwards.

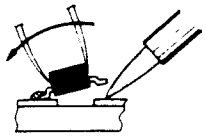


Fig. 3-2-6 Tr/Diode removal-2

3) Heat the other two leads simultaneously and remove the chip parts upwards.

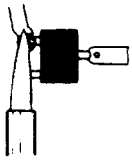


Fig. 3-2-7 Tr/Diode removal-3

4. Preheating and soldering

When setting new chip parts, especially capacitors, but except transistors, preheat them with hot air (150°C approx.) by use of a blower type of hair dryer for about 2 minutes just before soldering. For soldering, use a soldering iron of 30 watt approximately.

5. How to set and solder chip parts

1) Presolder the contact points of the circuit pattern to which the chip parts will be soldered.

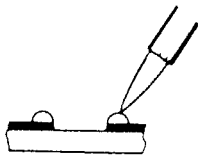


Fig. 3-2-8 Soldering-1

2) Holding down the chip parts with the chip parts replacing tool, solder it with a soldering iron.

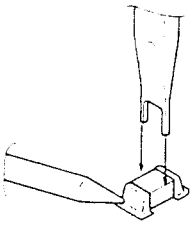


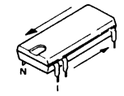
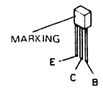
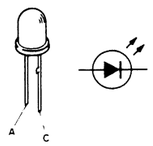
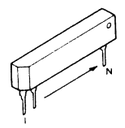
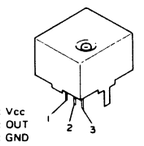
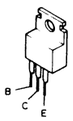
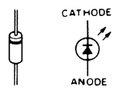
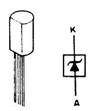
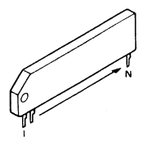
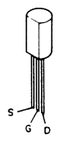
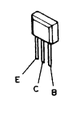
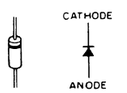
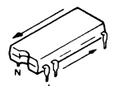
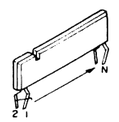
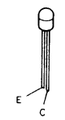
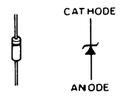
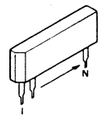
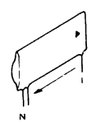
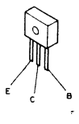
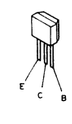
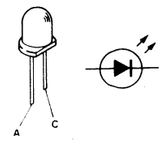
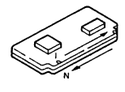
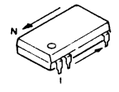
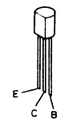
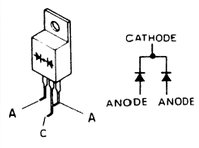
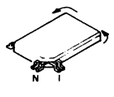
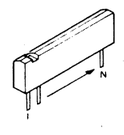
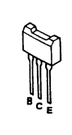
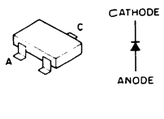
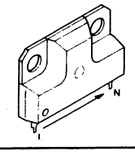
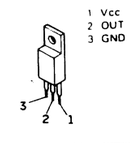
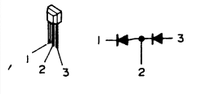
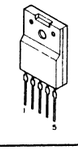
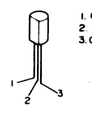
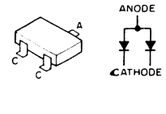
Fig. 3-2-9 Soldering-2

3.3 MAIN TYPES OF ACTIVE AND PACKAGE CIRCUITS

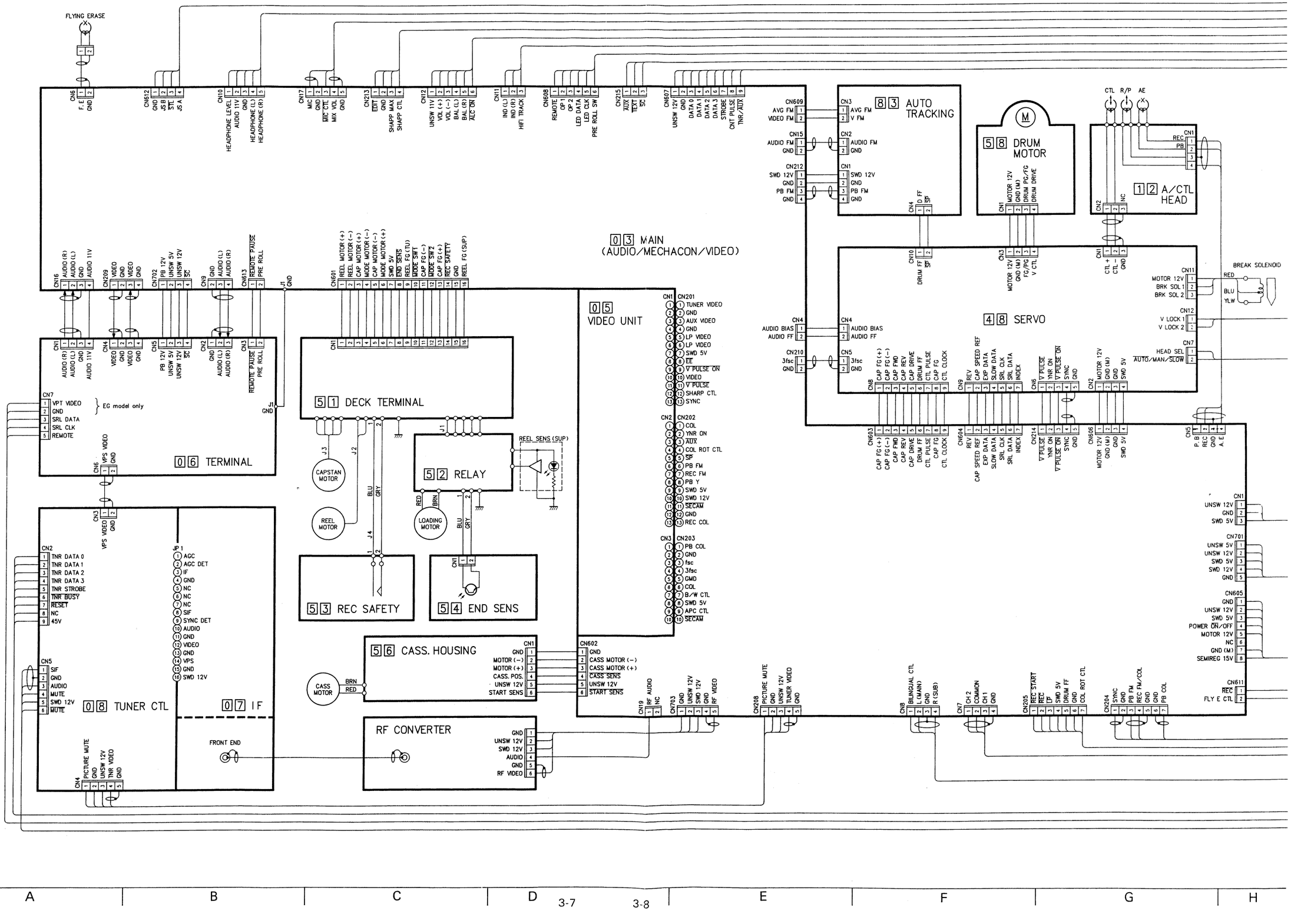
IC		
	NAME	L
A	AN3380NK	2A
	AN3886NK	4A
B	BA10324	4A
	BA15218N	7B
	BA6222	7B
	BA7106LS	4B
	BU3758AS	4A
	BU4066B	4A
C	CAT93C46P	4A
G	GP1U501	2B
	GP1U501X	2B
H	HD49722NT	6B
L	LA7222	3B
	LM324N	4A
	LM393	6B
M	MC7895ACT	8B
	MC74HC4538N	4A
	MSC7112-01SS	6B
	MSM16811RS	6B
	MSM6967RS	6B
	M50253P	1A
	M50255P	1A
	M50445-494SP	4A
	M50938A-321SP	4A
	M50938E-318SP	4A
	M51365SP	4A
	M5218P	4A
	M54647L	8A
S	SDA5642	4A
	SN74HC239N	4A
	SPS-413	2B
	STR-D1706	9A
	S-8053HNB	9B
T	TA7361AP	5A
	TA8405S	7A
	TDA3800GS	4A
U	UPC324C	4A
	UPC393C	6B
	UPD4066BC	4A
	UPD75216ACW-276	5B
	UPD75P216ACW276	5B
V	VC2087	4A
X	XRA15218N	7B
	XRA7106LS	4B

TRANSISTOR		
	NAME	L
DTA	DTA114ES	3D
	DTA124ES	3D
	DTA144ES	3D
	DTA144EU	4C
DTB	DTB114ES	3D
DTC	DTC114ES	3D
	DTC124EK	4C
	DTC124ES	3D
	DTC124XS	3D
	DTC143TS	3D
	DTC144EK	4C
	DTC144ES	3D
	DTC144WK	4C
	DTC144WS	3D
P	PN268R-NC	4D
U	UN4112	1C
	UN4211	1C
	UN4213	1C
	UN4319	1U
2SA	2SA1037K	4C
	2SA1267	2C
	2SA1309	2C
	2SA1309AR	1C
	2SA854S	2C
	2SA933S	6C
2SB	2SB1186	2D
	2SB810	5C
2SC	2SC1317	2C
	2SC1645S	6D
	2SC1740	2C
	2SC1740S	5D
	2SC1741S	5D
	2SC2412K	4C
	2SC3068	6D
	2SC3199	5D
	2SC3243	6D
	2SC3311A	1C
	2SC3354	1C
	2SC3399	5D
	2SC3402	5D
	2SC536SPA	5D
2SD	2SD1292	6D
	2SD1450	1C
	2SD1468S	6C
	2SD1796	2D
	2SD1809	6D
	2SD1856	2D
	2SD1863	7C
	2SD639R	1D
2SK	2SK381	5C
	2SK658	1D

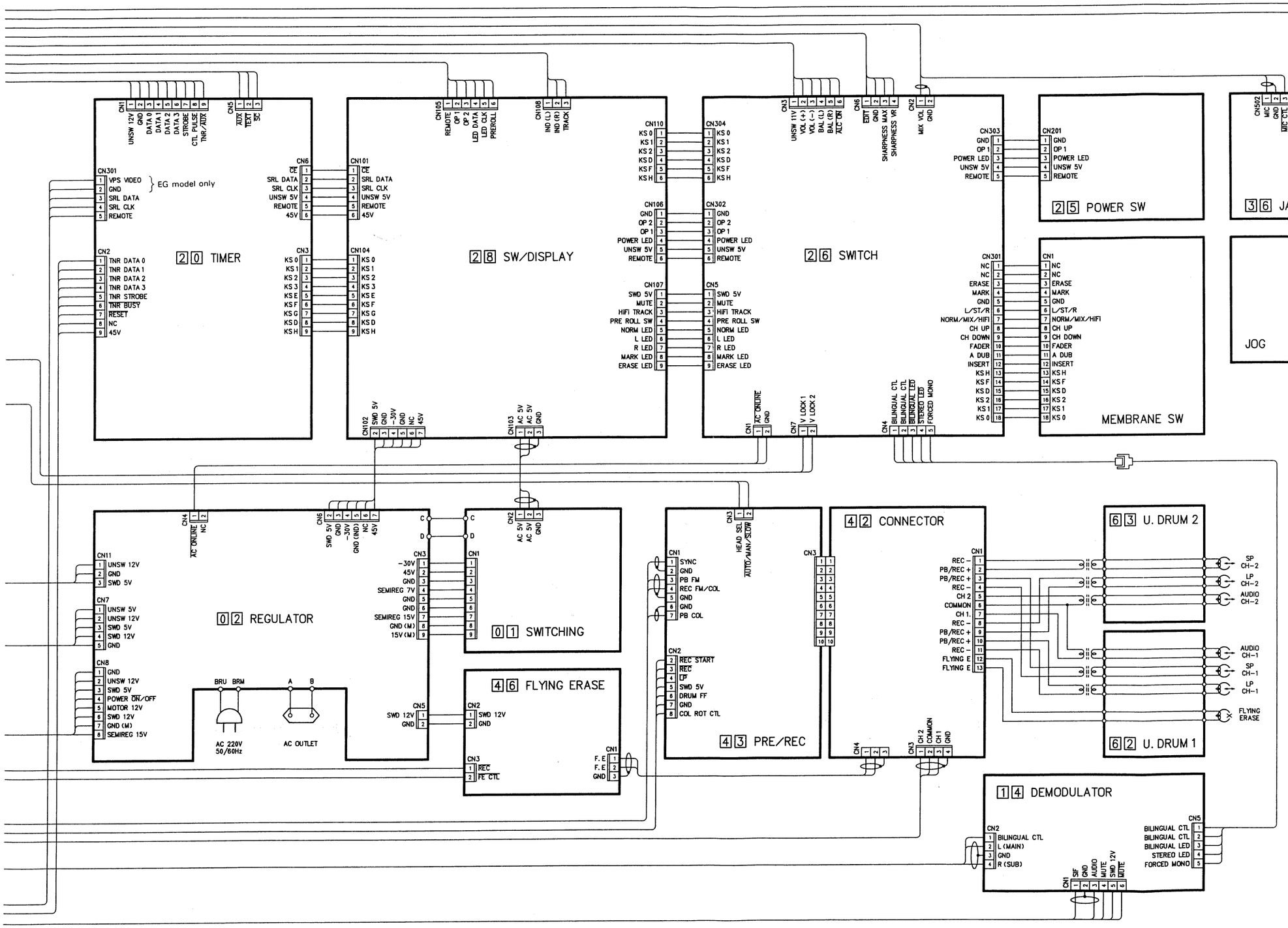
DIODE		
	NAME	L
A	AU01Z	3E
D	DAP202K	9E
	DA210S	8E
E	ERA48-02	3E
	E-452-2	3E
F	FMB-24	6E
	FML-12S	6E
	F5KQ40B	7E
	F6P20F	6E
H	HZS33EB1	4E
	HZS4.3EB2	4E
	HZS7.5EB2	4E
	HZS9.1EB2TJ	4E
	HZ2BLL	4E
	HZ6B1TE	4E
	HZ6B1TJ	4E
	HZ30-2	4E
L	LTZ-MR15	2E
M	MA151WA	9E
	MA165	3E
	MA29W(A)	3E
	MTZ10B	4E
	MTZ20BT-77	4E
	MTZ33AT-77	4E
	MTZ5.6CT-77	4E
	MTZ7.5B	4E
	MTZ8.2B	4E
	MTZJ4.7C	4E
O	OA90	3E
R	RD13ES-T1B3	4E
	RD16ES-T1B2	4E
	RD20ES-T1B2	4E
	RD4.7ES-T1B3	4E
	RD5.1ES-T1B2	4E
	RD5.6ES-T1B3	4E
	RD6.2ES-T1B3	4E
	RD8.2ES-T1B2	4E
	RD9.1EB3	4E
	RD9.1ES-T1B2	4E
	RU1A	3E
S	SLH-34MC3F	1E
	SLH-34VC3F	1E
	SLH-34YC3F	1E
U	UZ13BSC	4E
	UZ2.0BSB	4E
	UZ5.1BSB	4E
	UZ6.2BSC	4E
	UZ8.2BSC	4E
	UZ9.1BSC	4E
1	1SS133	3E
	10E6-F2	3E

	Integrated Circuit		Transistor		Diode
	A	B	C	D	E
1					
2					
3					
4					
5					
6					
7					
8					
9					

3.4 BOARD INTERCONNECTIONS


FLYING ERASE
CN6 F.E GND
CN612 GND JS B STL JS A
CN10 HEADPHONE LEVEL AUDIO 11V GND HEADPHONE (L) HEADPHONE (R)
CN17 MIC GND MIC CTL MIX VOL GND
CN213 EDIT GND SHAPP MAX SHAPP CTL
CN12 UNSW 11V VOL (+) VOL (–) BAL (L) BAL (R) ALC ON
CN11 IND (L) IND (R) HiFi TRACK
CN608 REMOTE OP 1 OP 2 LED DATA LED CLK PRE ROLL SW
CN215 AUX TEXT SC
CN607 UNSW 12V GND DATA 0 DATA 1 DATA 2 DATA 3 STROBE CNT PULSE TNR/AUTO
0 3 MAIN (AUDIO/MECHACON/VIDEO)
CN16 AUDIO (R) AUDIO (L) GND AUDIO 11V
CN209 VIDEO GND VIDEO GND
CN702 PB 12V UNSW 5V UNSW 12V SC
CN9 GND AUDIO (L) AUDIO (R)
CN613 REMOTE PAUSE PRE ROLL
J1 GND
CN601 REEL MOTOR (+) REEL MOTOR (–) CAP MOTOR (+) MODE MOTOR (–) CAP MOTOR (–) MODE MOTOR (+) SWD 5V END SENS REEL FG (TU) MODE SW1 CAP FG (–) MODE SW2 CAP FG (+) REC SAFETY GND REEL FG (SUP)
0 5 VIDEO UNIT
CN1 CN201 TUNER VIDEO GND AUX VIDEO GND LP VIDEO LP VIDEO SWD 5V EE V PULSE ON VIDEO V PULSE SHARP CTL SYNC
CN2 CN202 COL YNR ON AUX COL ROT CTL SIF PB FM REC FM PB Y SWD 5V SWD 12V SECAM GND REC COL
CN3 CN203 PB COL GND fsc 3fsc GND COL B/W CTL SWD 5V APC CTL SECAM
5 1 DECK TERMINAL
J1 GND
J3 J2 J4
CAPSTAN MOTOR
REEL MOTOR
BLU GRY
5 2 RELAY
RED BRN
LOADING MOTOR
BLU GRY
REEL SENS (SUP)
5 3 REC SAFETY
5 4 END SENS
CN1
5 6 CASS. HOUSING
CASS MOTOR
BRN RED
CN1 GND MOTOR (–) MOTOR (+) CASS. POS. UNSW 12V START SENS
CN602 GND CASS MOTOR (–) CASS MOTOR (+) CASS SENS UNSW 12V START SENS
CN7 VPT VIDEO GND SRL DATA SRL CLK REMOTE
EG model only
0 6 TERMINAL
CN6 VPS VIDEO GND
CN3 VPS VIDEO GND
CN2 TNR DATA 0 TNR DATA 1 TNR DATA 2 TNR DATA 3 TNR STROBE TNR BUSY RESET NC 45V
JP 1 AGC AGC DET IF GND NC NC NC SIF SYNC DET AUDIO GND VIDEO GND VPS GND SWD 12V
CN5 SIF GND AUDIO MUTE SWD 12V MUTE
0 8 TUNER CTL
0 7 IF
FRONT END
CN4 PICTURE MUTE GND UNSW 12V TNR VIDEO GND
RF CONVERTER
GND UNSW 12V SWD 12V AUDIO GND RF VIDEO
CN19 RF AUDIO NC
CN703 GND UNSW 12V SWD 12V GND RF VIDEO
CN208 PICTURE MUTE GND UNSW 12V TUNER VIDEO GND
8 3 AUTO TRACKING
CN609 AVG FM VIDEO FM
CN3 AVG FM V FM
CN15 AUDIO FM GND
CN2 AUDIO FM GND
CN212 SWD 12V GND PB FM GND
CN1 SWD 12V GND PB FM GND
CN4 DRUM FF 5P
5 8 DRUM MOTOR
CN1 MOTOR 12V GND (M) DRUM FG/FG DRUM DRIVE
CN10 DRUM FF 5P
CN3 MOTOR 12V GND (M) FG/PG V CTL
CTL R/P AE
CN1 REC PB
1 2 A/CTL HEAD
CN2 NC
CN1 CTL + CTL – GND
BREAK SOLENOID
RED BLU YLW
4 8 SERVO
CN4 AUDIO BIAS AUDIO FF
CN210 3fsc GND
CN5 3fsc GND
CN11 MOTOR 12V BRK SOL 1 BRK SOL 2
CN12 V LOCK 1 V LOCK 2
CN7 HEAD SEL AUTO/MAN/SLOW
CN8 CAP FG (+) CAP FG (–) CAP PWD CAP REV CAP DRIVE DRUM FF CTL PULSE CAP FG CTL CLOCK
CN9 REV CAP SPEED REF EXP DATA SLOW DATA SRL CLK SRL DATA INDEX
CN6 V PULSE YNR ON V PULSE ON SYNC GND
CN2 MOTOR 12V GND (M) GND SWD 5V
CN603 CAP FG (+) CAP FG (–) CAP PWD CAP REV CAP DRIVE DRUM FF CTL PULSE CAP FG CTL CLOCK
CN604 REV CAP SPEED REF EXP DATA SLOW DATA SRL CLK SRL DATA INDEX
CN214 V PULSE YNR ON V PULSE ON SYNC GND
CN606 MOTOR 12V GND (M) GND SWD 5V
CN5 P. B REC GND A. E
CN1 UNSW 12V GND SWD 5V
CN701 UNSW 5V UNSW 12V SWD 5V SWD 12V GND
CN605 GND UNSW 12V SWD 5V POWER ON/OFF MOTOR 12V NC GND (M) SEMIREG 15V
CN611 REC FLY E CTL
CN8 BILINGUAL CTL L (MAIN) GND R (SUB)
CN7 CH 2 COMMON CH 1 GND
CN205 REC START REC EP SWD 5V DRUM FF GND COL ROT CTL
CN204 SYNC GND PB FM REC FM/COL GND GND PB COL

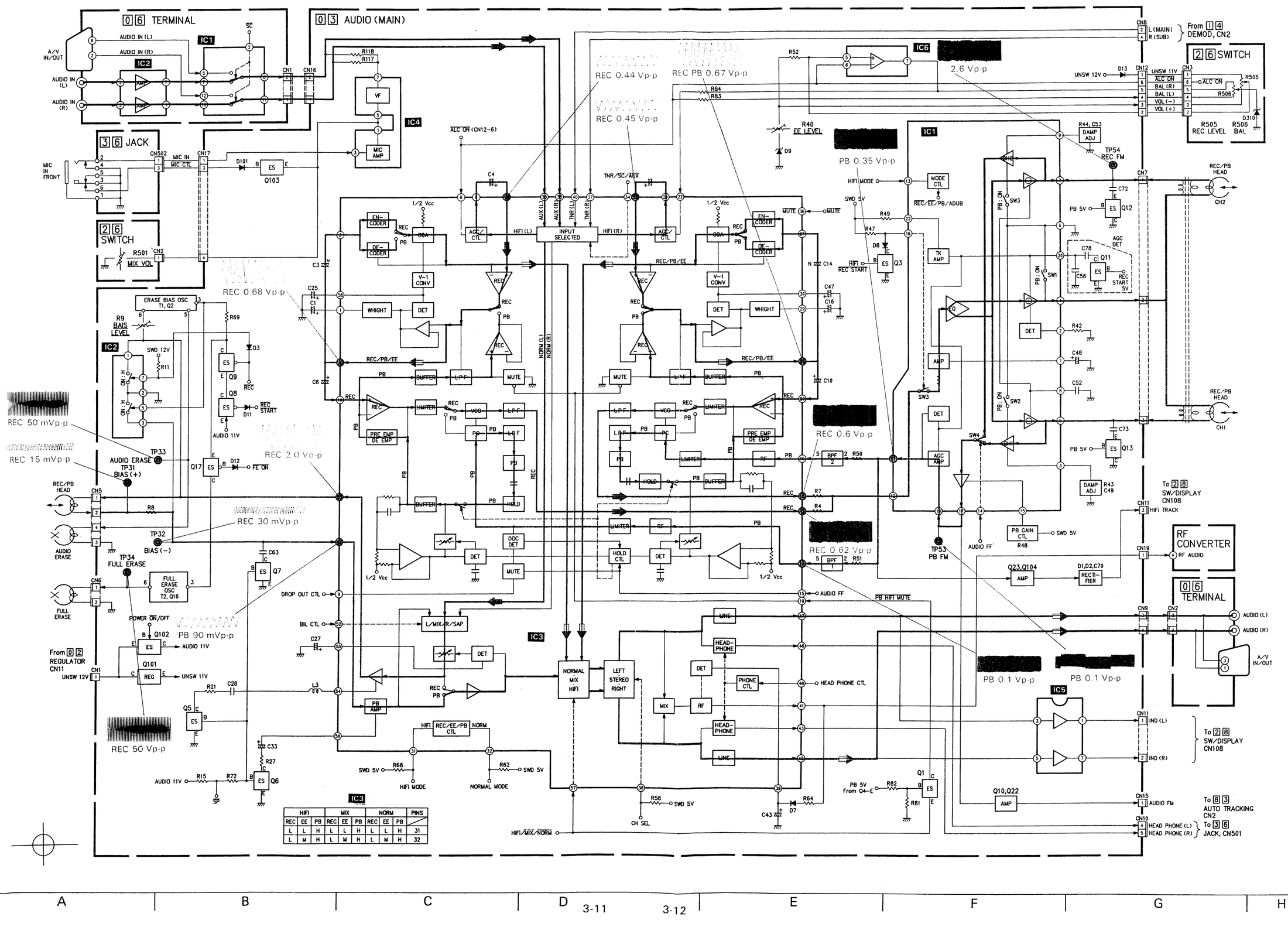
3-7 3-8


CN1 UNSW 12V GND DATA 0 DATA 1 DATA 2 DATA 3 STROBE CTL PULSE TNR/AUX
CN5 AUX TEXT SC
CN105 REMOTE OP 1 OP 2 LED DATA LED CLK PREROLL
CN108 IND (L) IND (R) TRACK
CN3 UNSW 11V VOL (+) VOL (-) BAL (L) BAL (R) ALC ON
CN6 EDIT GND SHARPNESS MAX SHARPNESS VR
CN2 MIX VOL GND
CN502 MIC GND MIC CTL
CN501 HEADPHONE LEVEL AUDIO 11V GND HEADPHONE (L) HEADPHONE (R)
CN301 VPS VIDEO GND SRL DATA SRL CLK REMOTE
EG model only
CN6 CE SRL DATA SRL CLK UNSW 5V REMOTE 45V
CN101 CE SRL DATA SRL CLK UNSW 5V REMOTE 45V
CN110 KS 0 KS 1 KS 2 KS D KS F KS H
CN304 KS 0 KS 1 KS 2 KS D KS F KS H
CN303 GND OP 1 POWER LED UNSW 5V REMOTE
CN201 GND OP 1 POWER LED UNSW 5V REMOTE
CN106 GND OP 2 OP 1 POWER LED UNSW 5V REMOTE
CN302 GND OP 2 OP 1 POWER LED UNSW 5V REMOTE
CN2 TNR DATA 0 TNR DATA 1 TNR DATA 2 TNR DATA 3 TNR STROBE TNR BUSY RESET NC 45V
CN3 KS 0 KS 1 KS 2 KS 3 KS E KS F KS G KS D KS H
CN104 KS 0 KS 1 KS 2 KS 3 KS E KS F KS G KS D KS H
CN107 SWD 5V MUTE HIFI TRACK PRE ROLL SW NORM LED L LED R LED MARK LED ERASE LED
CN5 SWD 5V MUTE HIFI TRACK PRE ROLL SW NORM LED L LED R LED MARK LED ERASE LED
CN301 NC NC ERASE MARK GND L/ST/R NORM/MIX/HIFI CH UP CH DOWN FADER A DUB INSERT KS H KS F KS D KS 2 KS 1 KS 0
CN1 NC NC ERASE MARK GND L/ST/R NORM/MIX/HIFI CH UP CH DOWN FADER A DUB INSERT KS H KS F KS D KS 2 KS 1 KS 0
GND JS B STL JS A
CN102 SWD 5V GND -30V GND NC 45V
CN103 AC 5V AC 5V GND
CN1 AC ONLINE GND
CN7 V LOCK 1 V LOCK 2
CN4 BILINGUAL CTL BILINGUAL CTL BILINGUAL LED STEREO LED FORCED MONO
20 TIMER
28 SW/DISPLAY
26 SWITCH
25 POWER SW
36 JACK
JOG
MEMBRANE SW
CN4 AC ONLINE NC
CN6 SWD 5V GND -30V GND (IND) NC 45V
CN2 AC 5V AC 5V GND
CN11 UNSW 12V GND SWD 5V
CN7 UNSW 5V UNSW 12V SWD 5V SWD 12V GND
CN8 GND UNSW 12V SWD 5V POWER ON/OFF MOTOR 12V SWD 12V GND (M) SEMIREG 15V
BRU BRM A B
AC 220V 50/60Hz
AC OUTLET
02 REGULATOR
CN3 -30V 45V GND SEMIREG 7V GND GND SEMIREG 15V GND (M) 15V (M)
CN1 SYNC GND PB FM REC FM/COL GND GND PB COL
01 SWITCHING
CN5 SWD 12V GND
CN2 SWD 12V GND
CN3 REC PE CTL
46 FLYING ERASE
CN1 F.E F.E GND
CN3 HEAD SEL AUTO/MAN/SCSH
CN2 REC START REC EF SWD 5V DRUM FF GND COL ROT CTL
43 PRE/REC
42 CONNECTOR
CN1 REC – PB/REC + PB/REC + REC – CH 2 COMMON CH 1. REC – PB/REC + PB/REC + REC – FLYING E FLYING E
CN4
CN3 CH 2 COMMON CH 1 GND
63 U. DRUM 2
SP CH–2
LP CH–2
AUDIO CH–2
62 U. DRUM 1
AUDIO CH–1
SP CH–1
LP CH–1
FLYING ERASE
14 DEMODULATOR
CN2 BILINGUAL CTL L (MAIN) GND R (SUB)
CN5 BILINGUAL CTL BILINGUAL CTL BILINGUAL LED STEREO LED FORCED MONO
CN1 SIF GND AUDIO MUTE SWD 12V MUTE

83	AUTO TRACKING
63	UPPER DRUM 2
62	UPPER DRUM 1
60	
59	
58	DRUM MOTOR
57	
56	CASSETTE HOUSING
55	
54	END SENSOR
53	REC SAFETY
52	RELAY
51	DECK TERMINAL
48	SERVO
46	FLYING ERASE
45	
44	
43	PRE/REC
42	CONNECT
41	
40	
36	JACK
30	
29	
28	SWITCH/DISPLAY
27	
26	SWITCH
25	POWER SWITCH
24	
23	
22	
21	
20	TIMER
17	
14	DEMODULATOR
13	
12	A/CTL HEAD
11	
10	
9	
8	TUNER CTL
7	I F
6	TERMINAL
5	
4	
3	MAIN (AUDIO/VIDEO/MECHACON)
2	REGULATOR
1	SWITCHING
NO.	PWB NAME

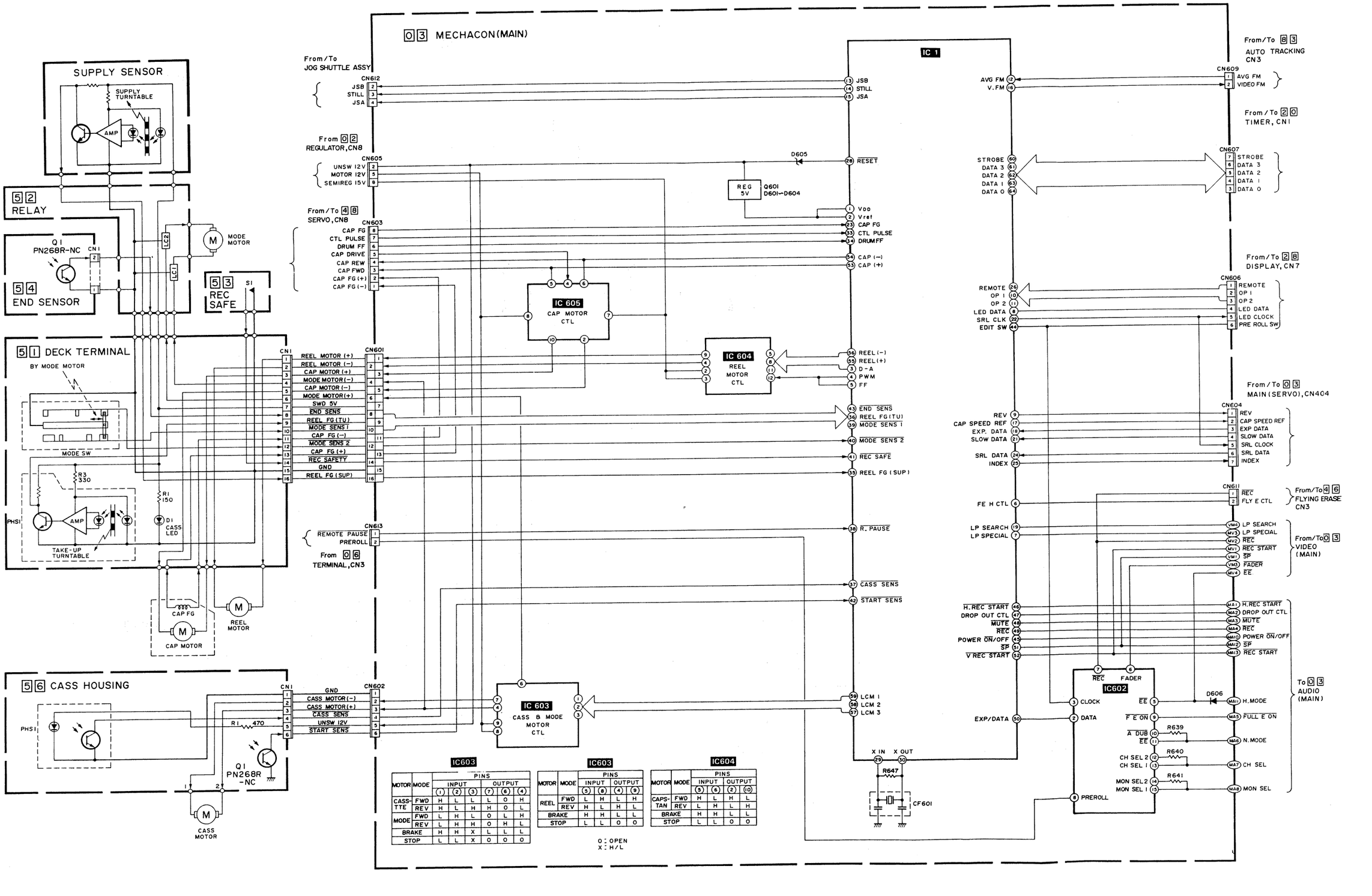
I J K L 3-9 3-10 M N O P

3.5 AUDIO BLOCK DIAGRAM



HIFI			MIX			NORM			PINS
REC	EE	PB	REC	EE	PB	REC	EE	PB	
L	L	H	L	L	H	L	L	H	31
L	M	H	L	M	H	L	M	H	32

3.6 MECHANISM CONTROL BLOCK DIAGRAM

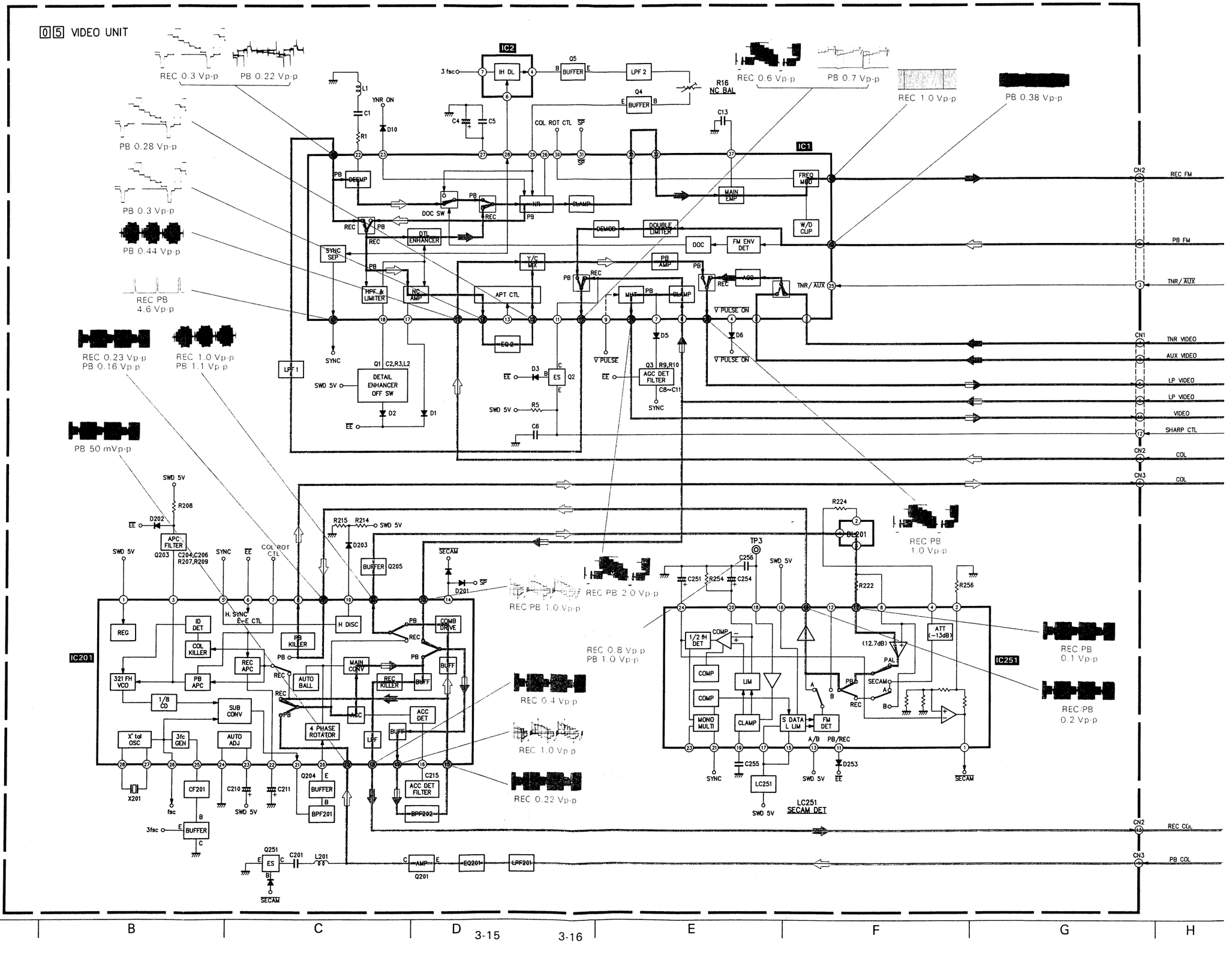


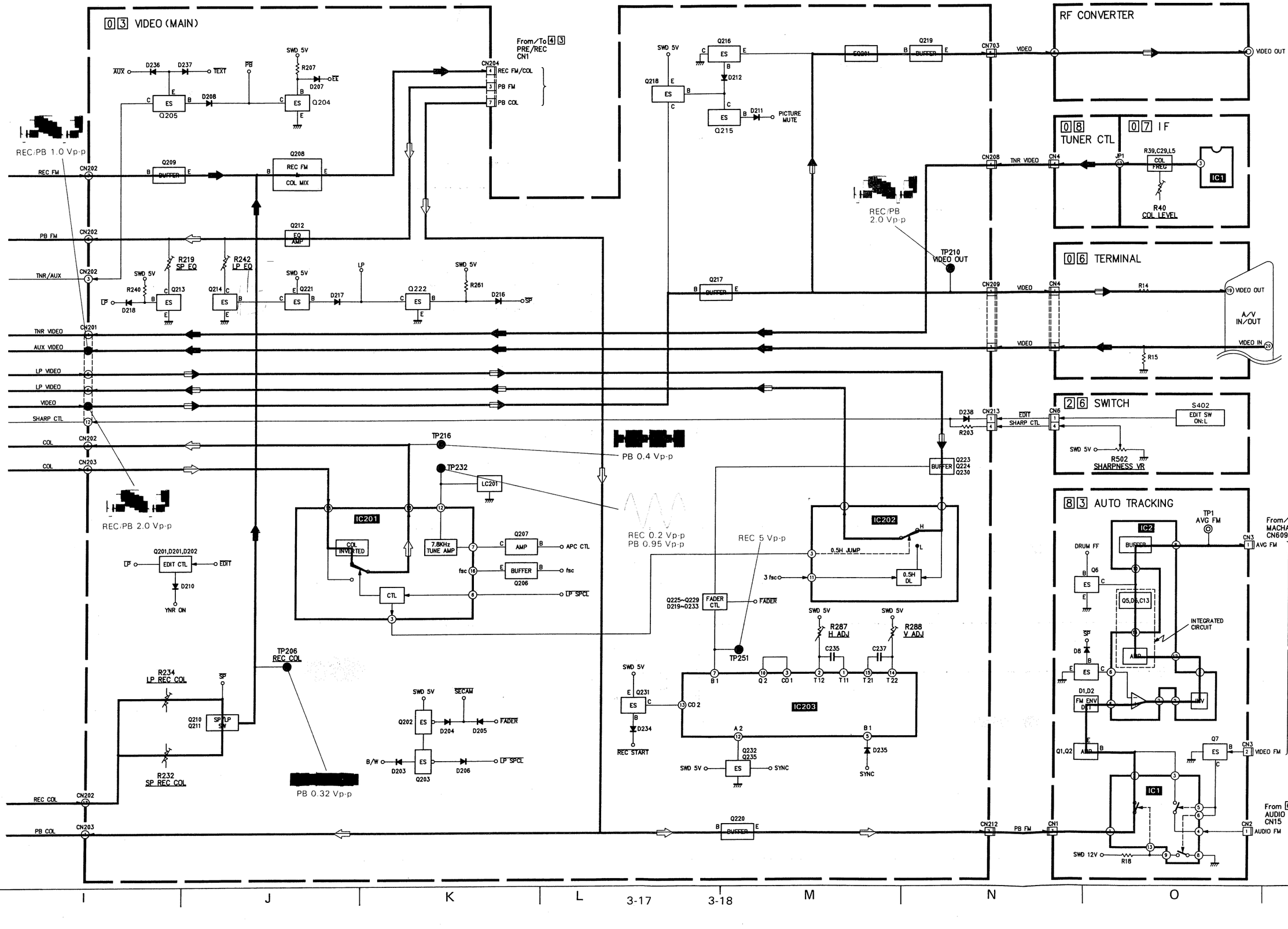
IC603 MOTOR	MODE	PINS INPUT (1)	(2)	(3)	OUTPUT (7)	(6)	(4)
CASSETTE	FWD	H	L	L	L	O	H
	REV	H	L	H	H	O	L
MODE	FWD	L	H	L	O	L	H
	REV	L	H	H	O	H	L
BRAKE		H	H	X	L	L	L
STOP		L	L	X	O	O	O

IC603 MOTOR	MODE	PINS INPUT (5)	(8)	OUTPUT (4)	(9)
REEL	FWD	L	H	L	H
	REV	H	L	H	L
BRAKE		H	H	L	L
STOP		L	L	O	O

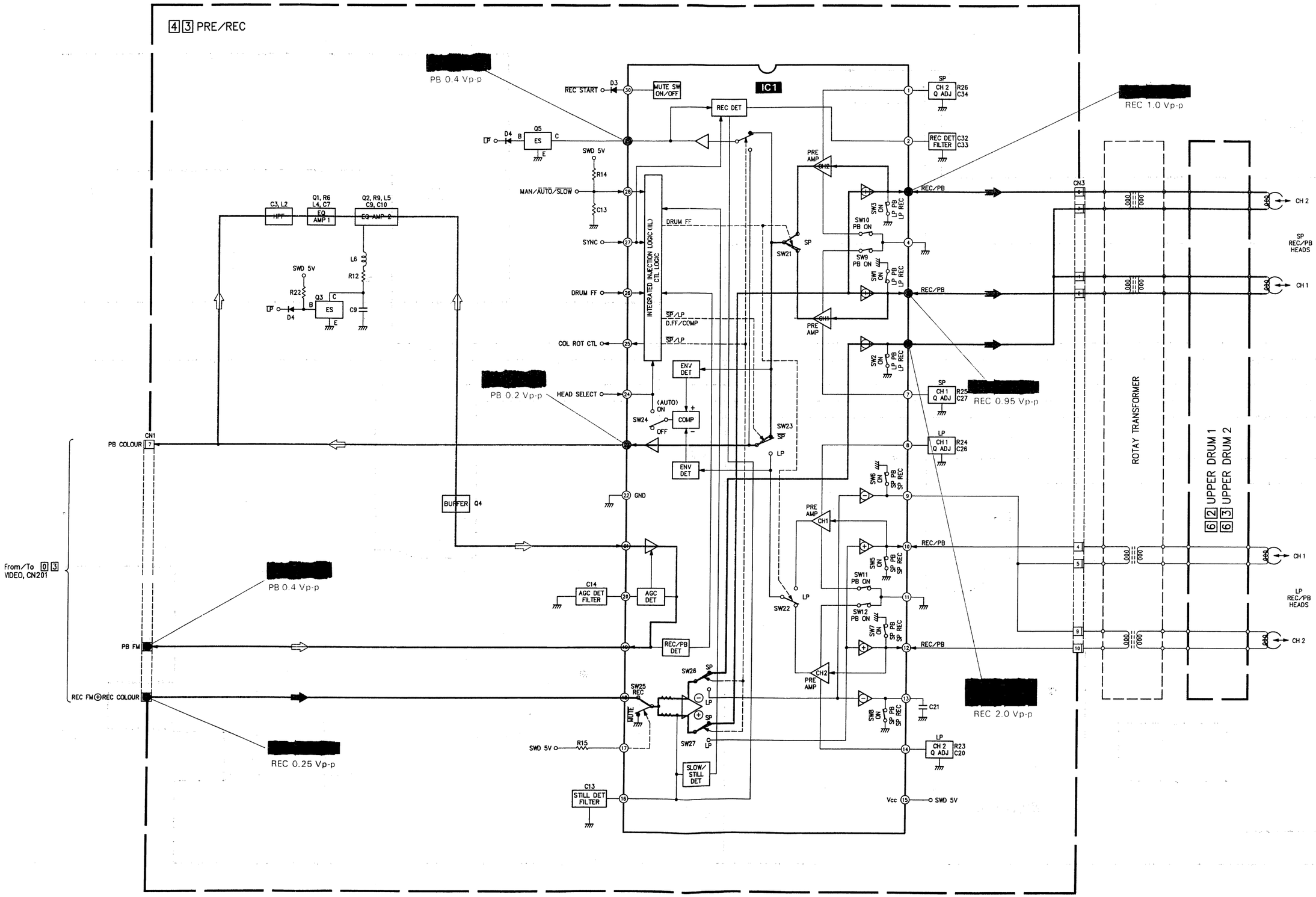
IC604 MOTOR	MODE	PINS INPUT (5)	(6)	OUTPUT (2)	(10)
CAPSTAN	FWD	H	L	H	L
	REV	L	H	L	H
BRAKE		H	H	L	L
STOP		L	L	O	O

3.7 VIDEO BLOCK DIAGRAM

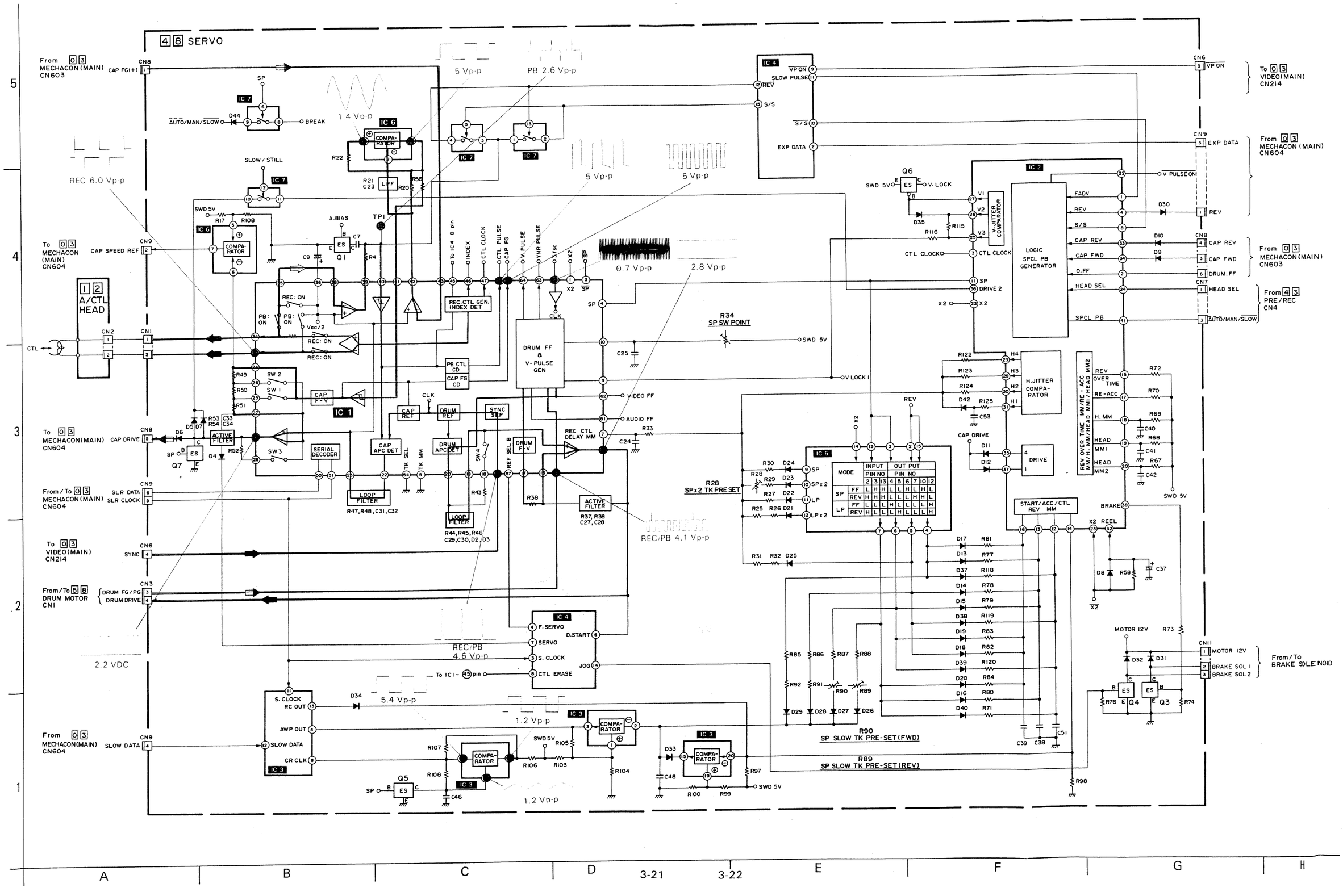



03 VIDEO (MAIN)
From/To 43 PRE/REC CN1
CN204
REC FM/COL
PB FM
PB COL
SWD 5V
R207
D207
EE
AUX
D236
D237
TEXT
PB
Q205
D208
Q204
REC/PB 1.0 Vp-p
CN202
REC FM
Q209
BUFFER
Q208
REC FM
COL MIX
PB FM
Q212
EQ AMP
TNR/AUX
CN201
R219 SP EQ
R242 LP EQ
LP
R240
Q213
Q214
Q221
Q222
D218
D217
D216
R261
TNR VIDEO
AUX VIDEO
LP VIDEO
LP VIDEO
VIDEO
SHARP CTL
COL
CN203
REC/PB 2.0 Vp-p
Q201,D201,D202
EDIT CTL
EDIT
D210
YNR ON
TP216
TP232
LC201
PB 0.4 Vp-p
REC 0.2 Vp-p
PB 0.95 Vp-p
IC201
COL INVERTED
7.8KHz TUNE AMP
Q207
AMP
APC CTL
fsc
BUFFER
Q206
CTL
LP SPCL
TP206
REC COL
R234
LP REC COL
R232
SP REC COL
Q210
Q211
SP/LP SW
PB 0.32 Vp-p
SECAM
Q202
D204
D205
FADER
B/W
D203
Q203
D206
REC COL
PB COL
Q220
BUFFER
REC 5 Vp-p
IC202
0.5H JUMP
0.5H DL
3 fsc
Q225~Q229
D219~D233
FADER CTL
FADER
TP251
R287 H ADJ
R288 V ADJ
C235
C237
IC203
B1
Q2
CO1
T12
T11
T21
T22
CO2
A2
B1
Q231
D234
REC START
Q232
Q235
SYNC
D235
SYNC
Q216
Q218
D212
Q215
D211
PICTURE MUTE
S0901
Q219
BUFFER
CN703
VIDEO
RF CONVERTER
VIDEO OUT
08 TUNER CTL
07 IF
CN208
TNR VIDEO
CN4
JP1
R39,C29,L5
COL PREC
IC1
R40
COL LEVEL
REC/PB 2.0 Vp-p
TP210 VIDEO OUT
Q217
BUFFER
06 TERMINAL
CN209
VIDEO
R14
19 VIDEO OUT
A/V IN/OUT
VIDEO IN 20
R15
26 SWITCH
D238
R203
CN213
CN6
EDIT
SHARP CTL
S402
EDIT SW ON:L
SWD 5V
R502
SHARPNESS VR
83 AUTO TRACKING
IC2
TP1 AVG FM
From/To 03 MACHACON (MAIN) CN609
CN3
AVG FM
BUFFER
DRUM FF
Q6
Q5,D5,C13
INTEGRATED CIRCUIT
SP
D8
AMP
D1,D2
FM ENV DET
INV
Q1,Q2
Q7
VIDEO FM
IC1
From 03 AUDIO CN15
CN2
AUDIO FM
CN212
PB FM
CN1
SWD 12V
R18
I
J
K
L
3-17
3-18
M
N
O
P

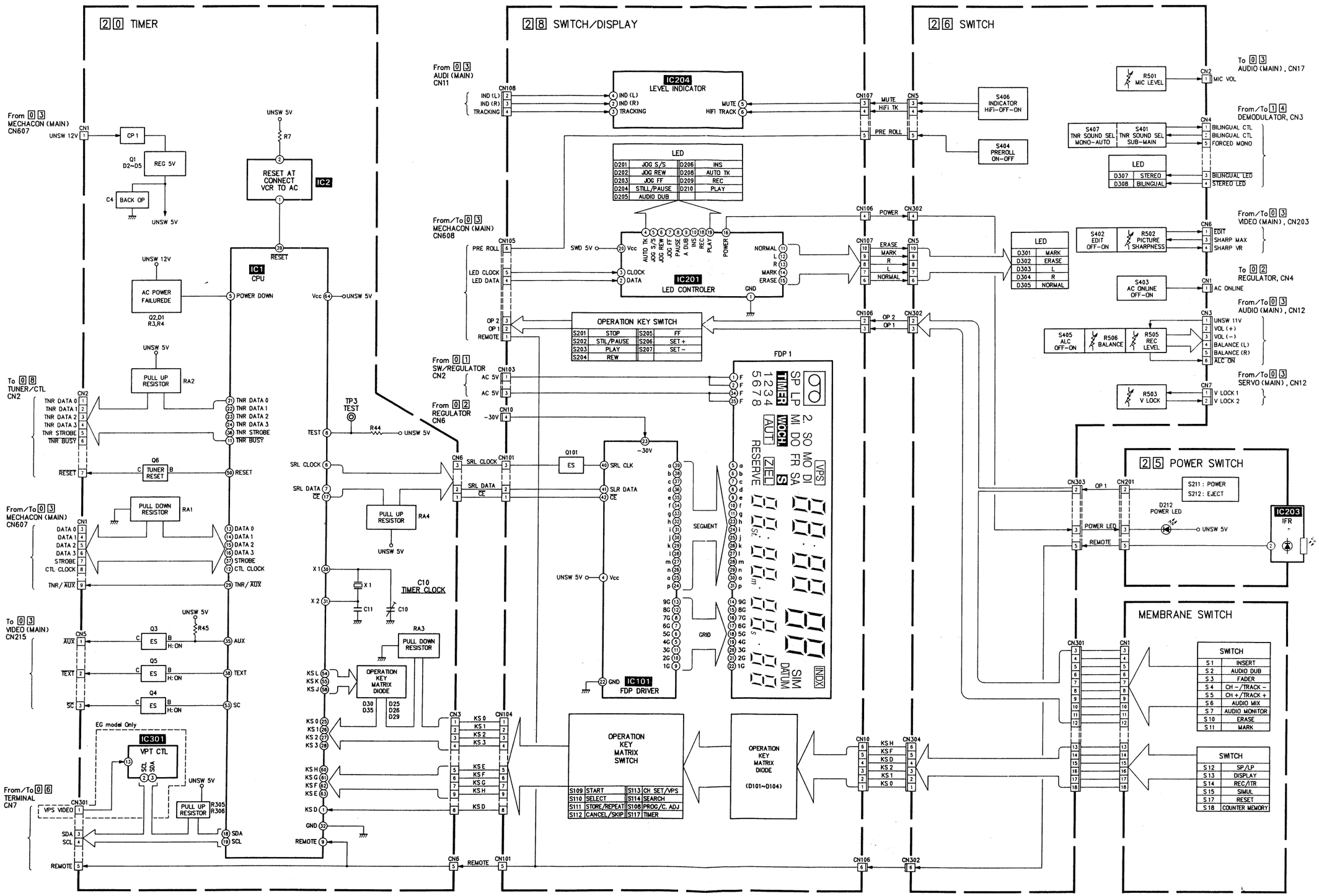
3.8 PRE/REC BLOCK DIAGRAM



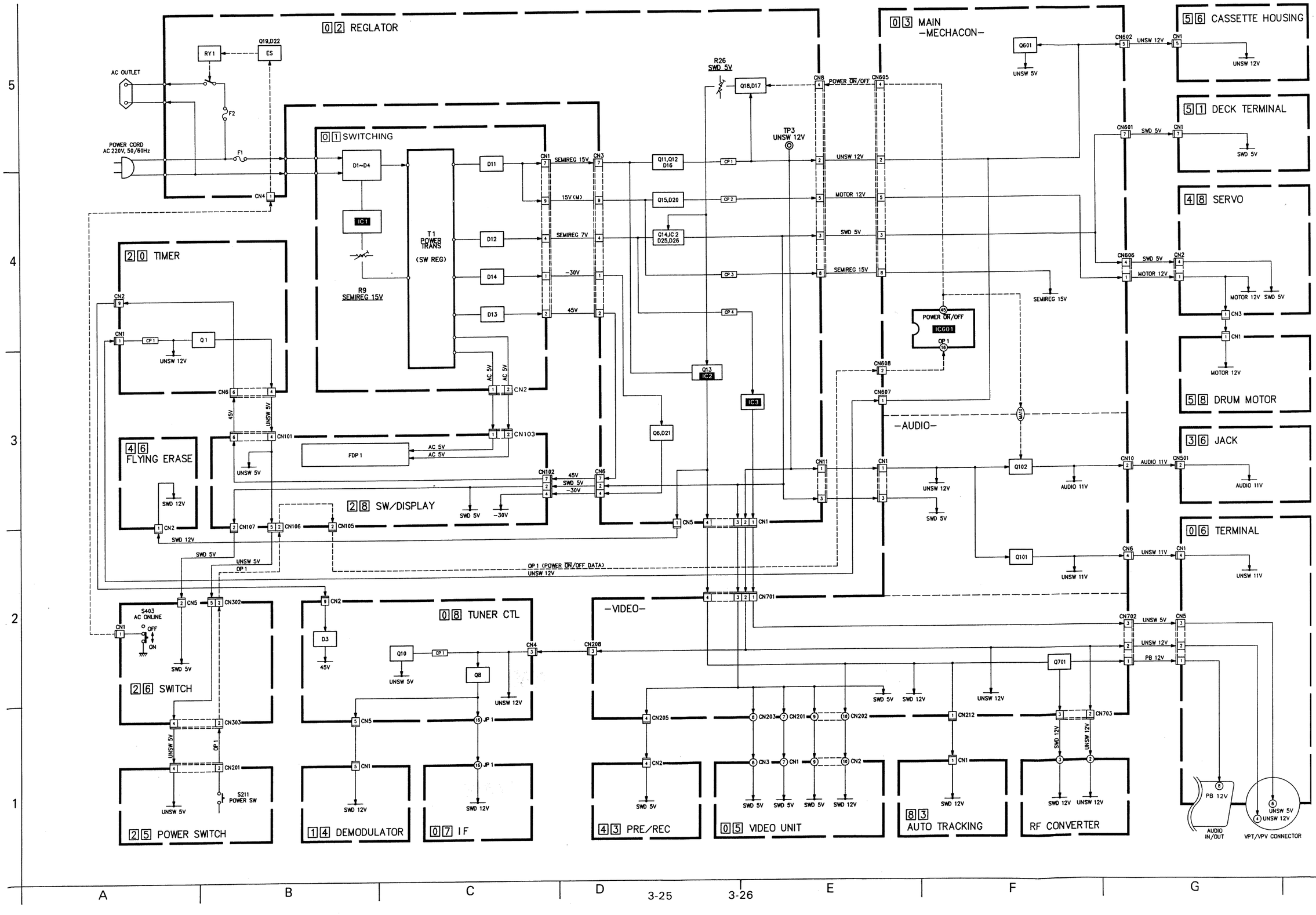
3.9 SERVO BLOCK DIAGRAM



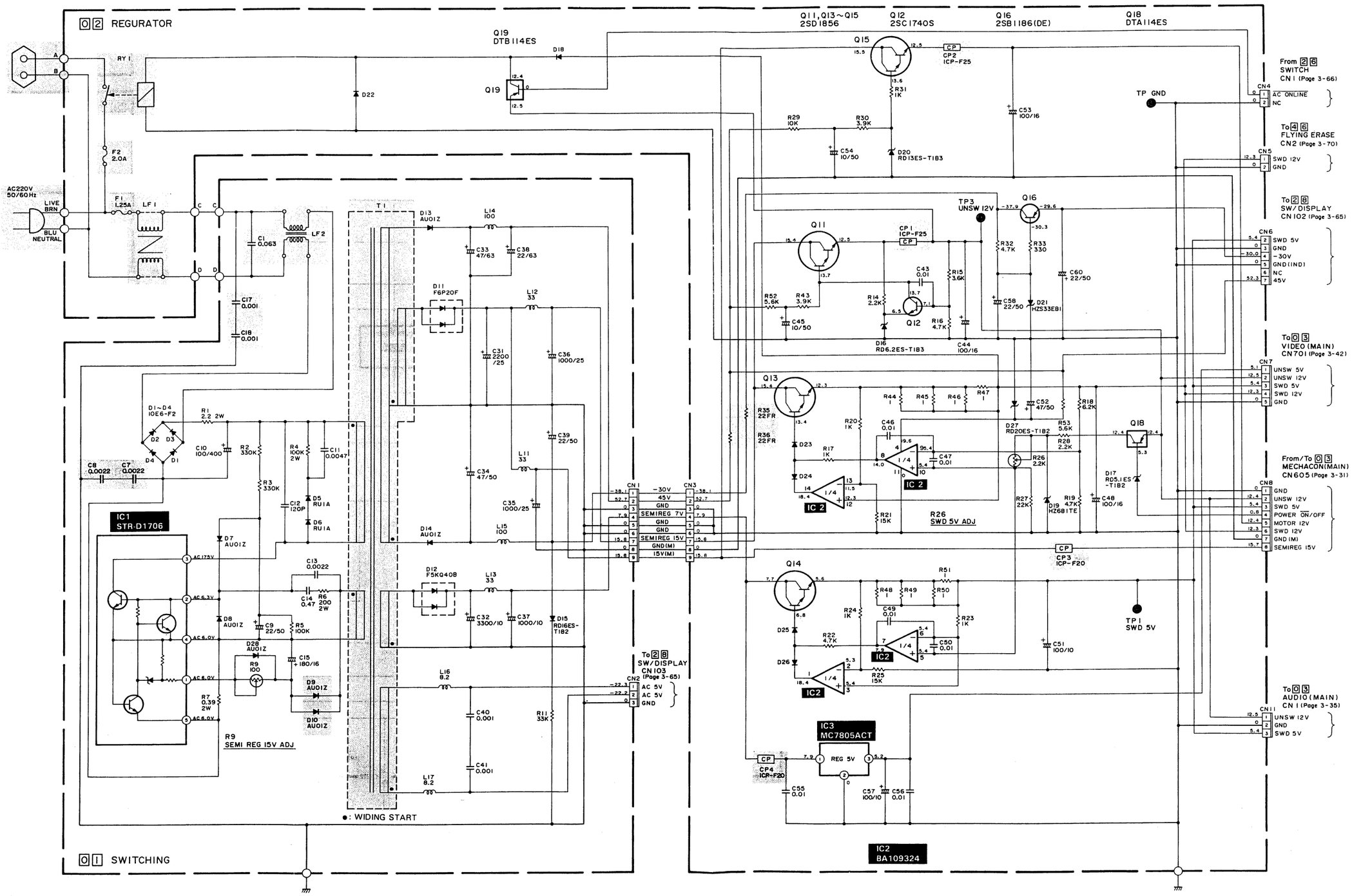
3.10 TIMER, DISPLAY/SWITCH AND SWITCH BLOCK DIAGRAMS



3.11 POWER SYSTEM BLOCK DIAGRAM



3.12 SWITCHING REGULATOR SCHEMATIC DIAGRAMS

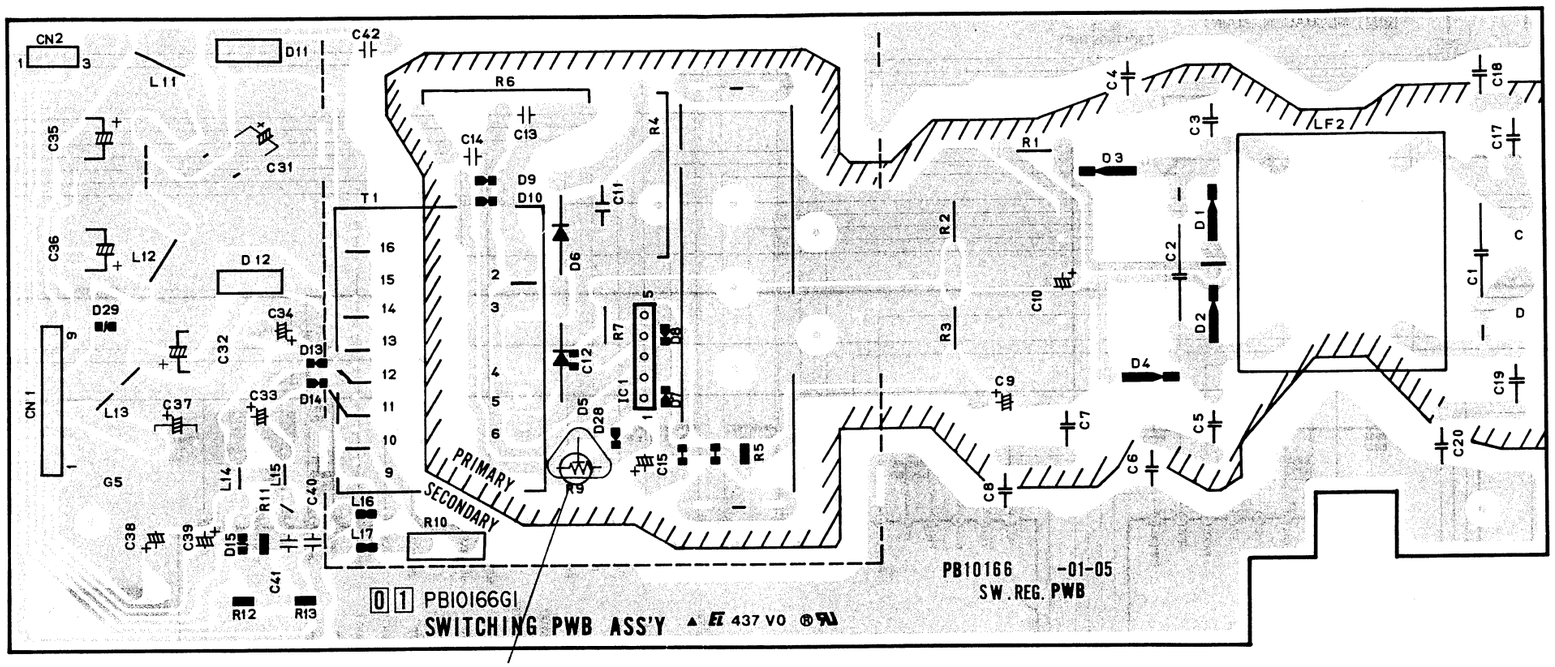


NOTES: 1. Shaded (▒) parts are critical for safety. Replace only with specified part numbers.

2. Voltages are DC-measured with a digital voltmeter during stop and tuner mode.

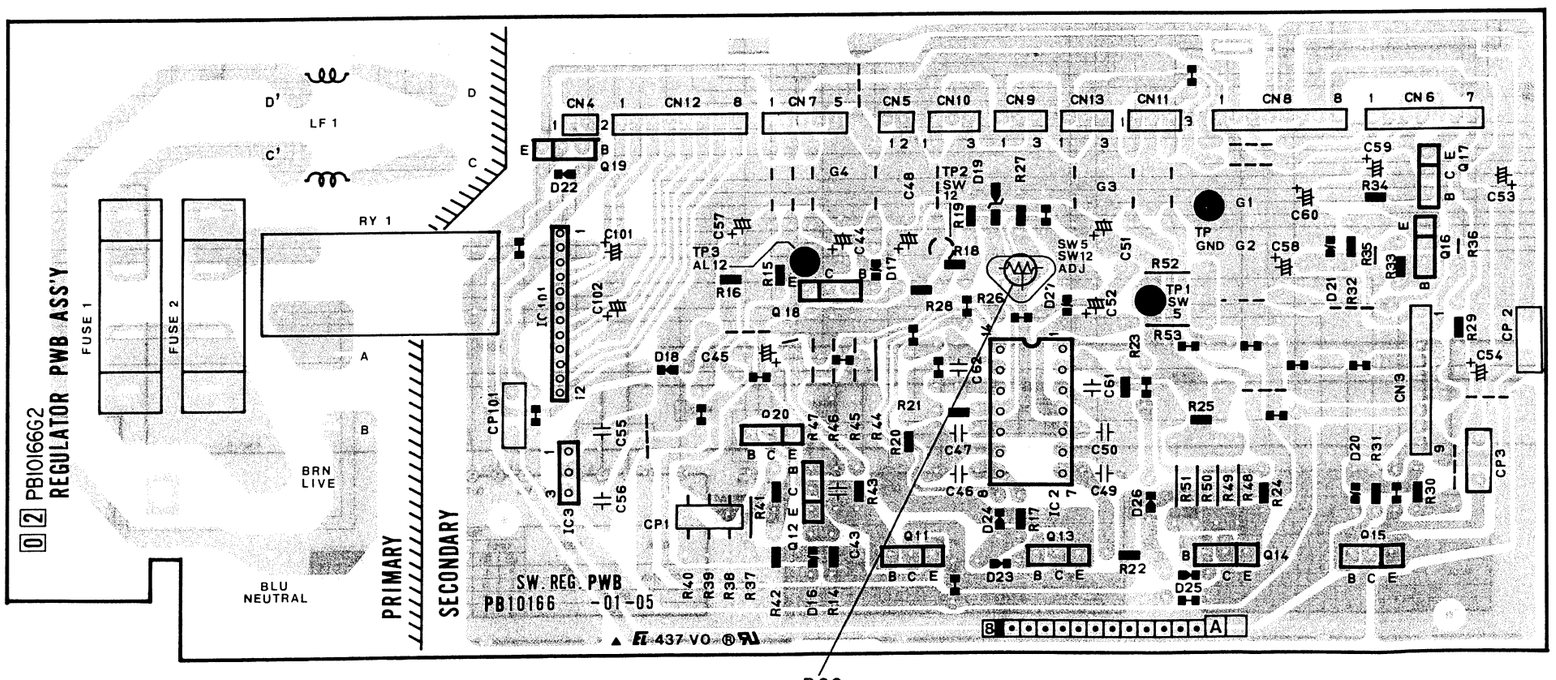
3.13 SWITCHING AND REGULATOR CIRCUIT BOARDS

—SWITCHING—



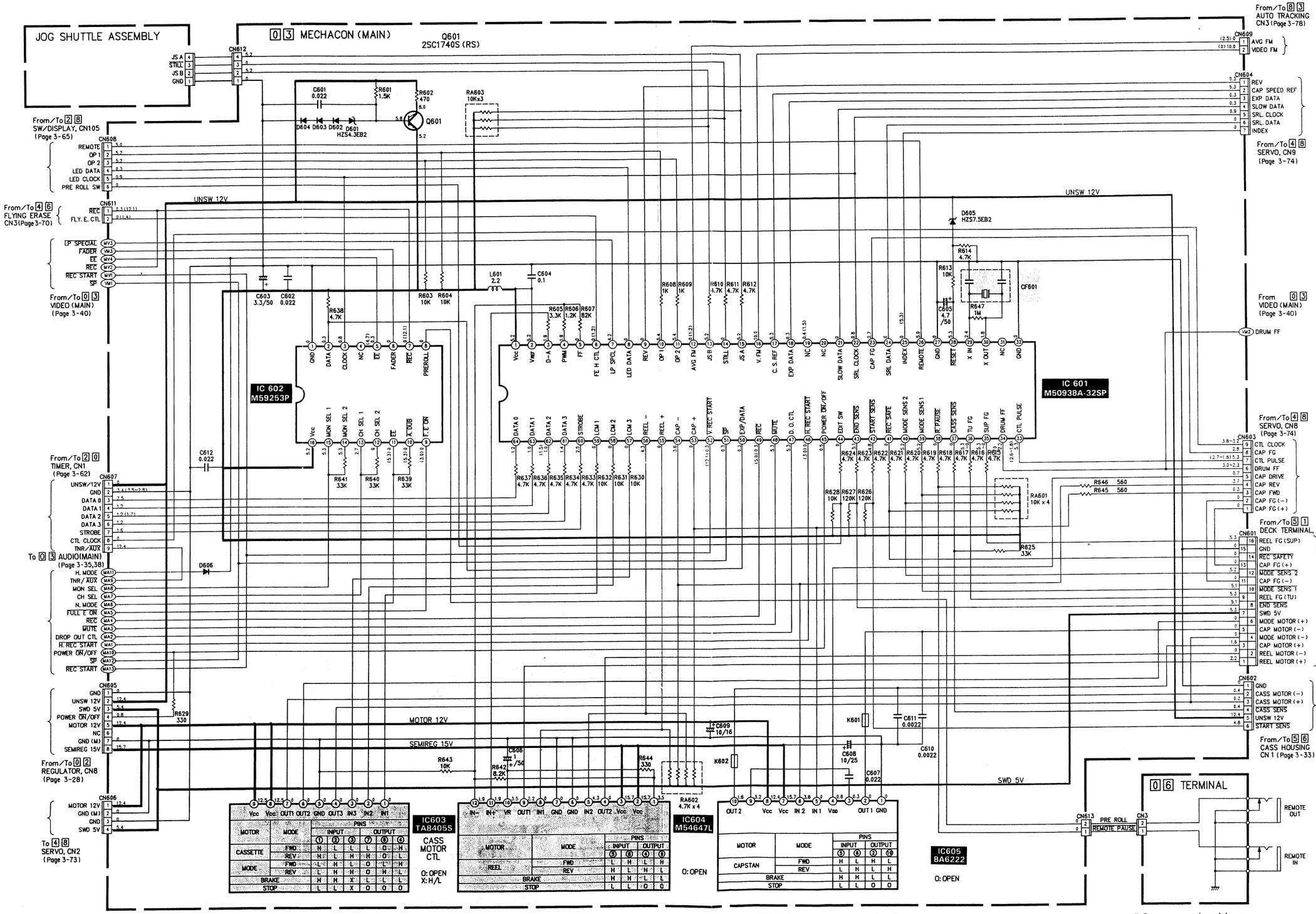
R9
SEMIREG 15V

—REGULATOR—



R26
SWD 5V

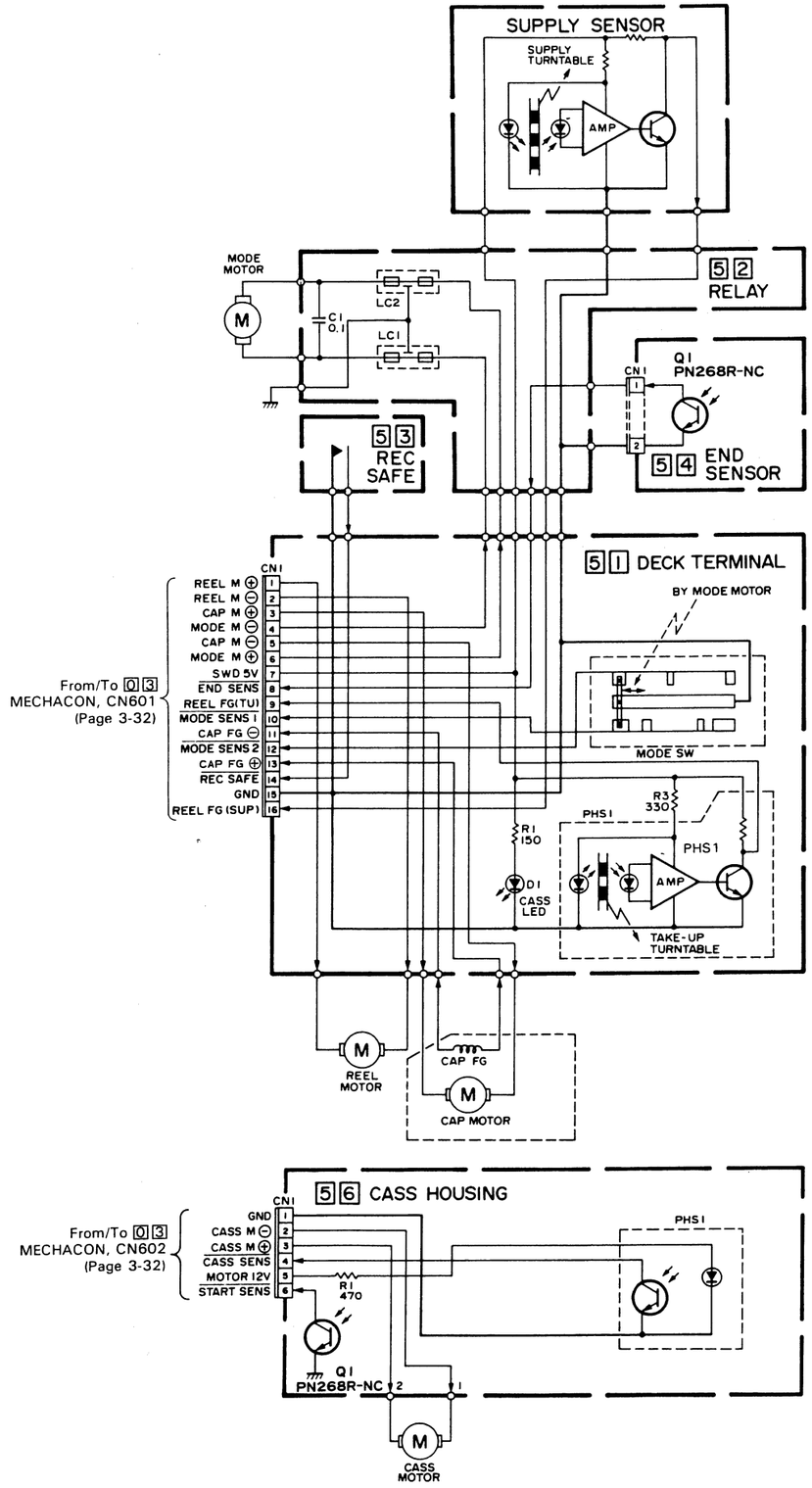
3.14 MECHANISM CONTROL (MAIN) SCHEMATIC DIAGRAM



NOTES: 1. Shaded (▒) parts are critical for safety. Replace only with specified part numbers.

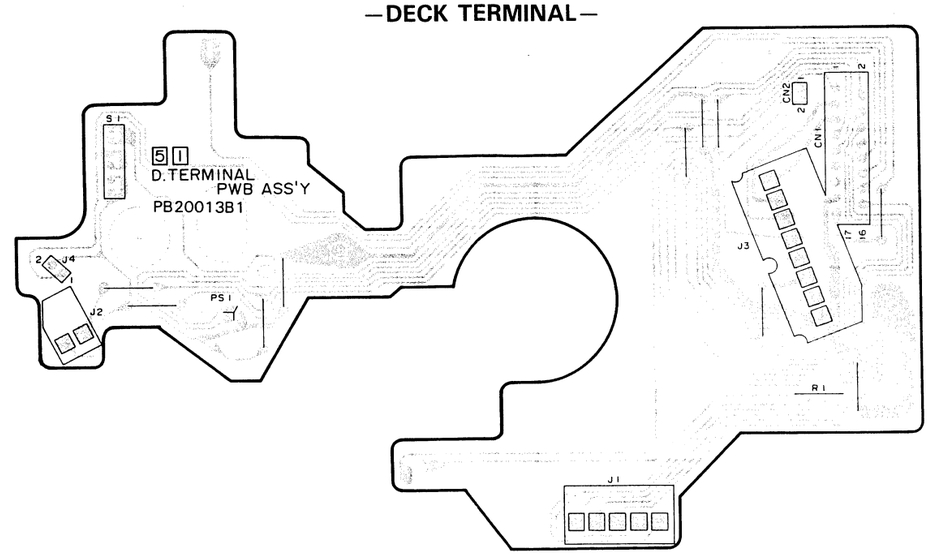
2. Voltages are DC-measured with a digital voltmeter during stop mode.

3.15 DECK TERMINAL, CASSETTE HOUSING, RELAY, END SENSOR AND REC SAFETY SCHEMATIC DIAGRAMS

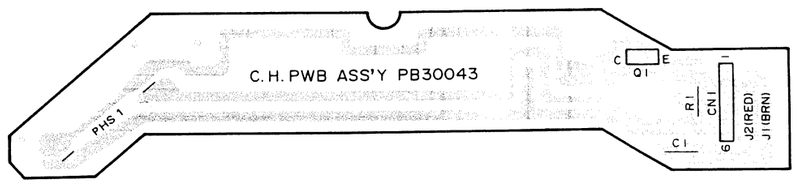


3.16 DECK TERMINAL, CASSETTE HOUSING, RELAY, END SENSOR, REC SAFETY AND AUDIO/CTL HEAD CIRCUIT BOARDS

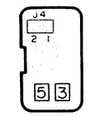
—DECK TERMINAL—



—CASSETTE HOUSING—

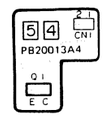


—REC SAFETY—



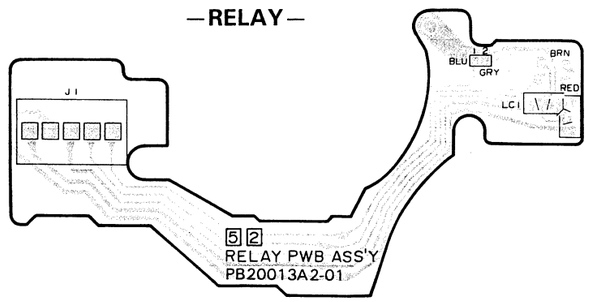
PB20013A3

—END SENSOR—

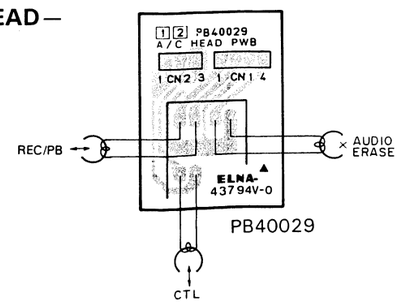


PB20013A4

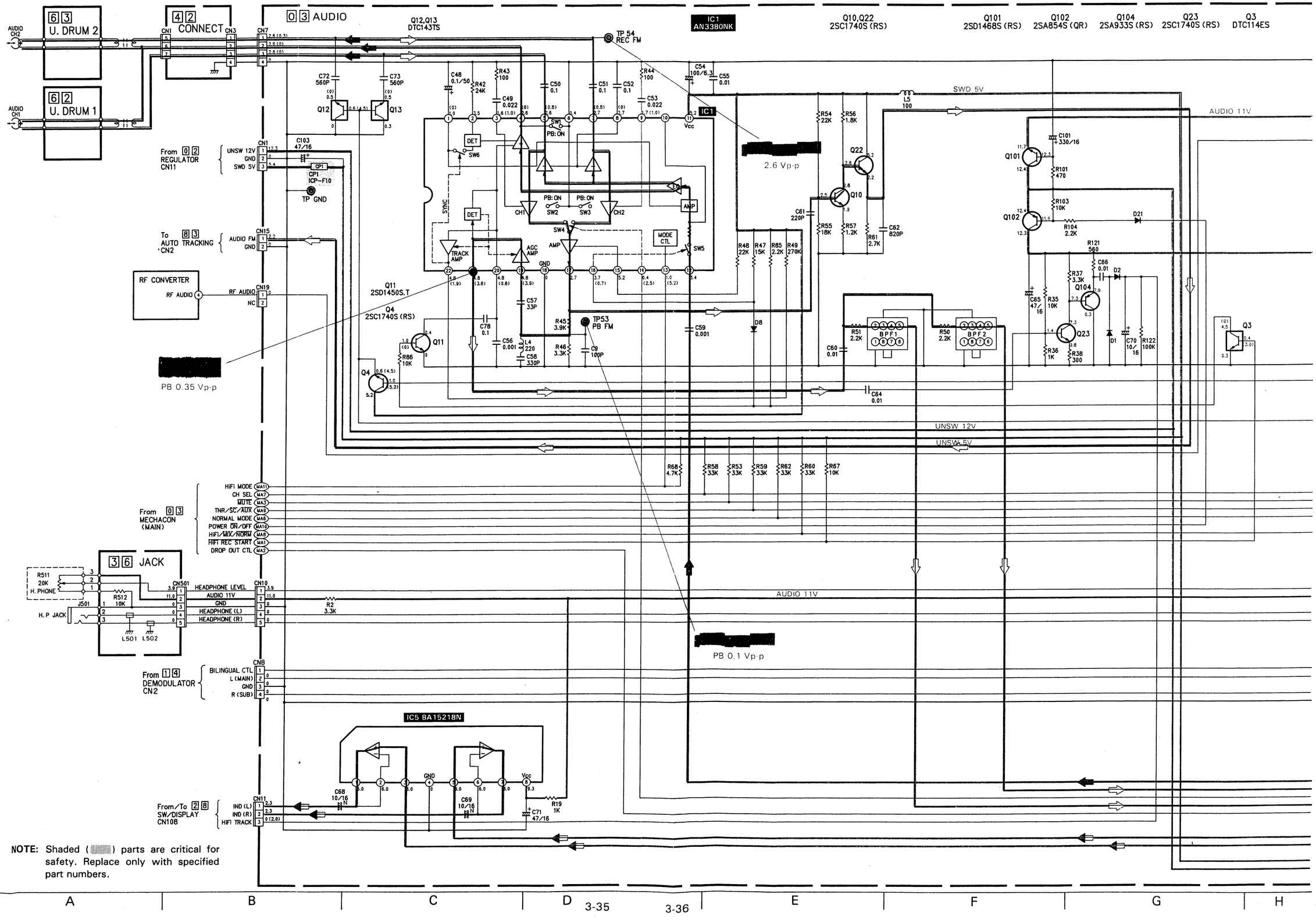
—RELAY—



—AUDIO/CTL HEAD—



3.17 AUDIO (MAIN), TERMINAL AND JACK SCHEMATIC DIAGRAMS



NOTE: Shaded (▒) parts are critical for safety. Replace only with specified part numbers.

IC3
PB20167A-01

PB 90 mVp-p

AUDIO 11V

Q5,Q6,Q7
DTC114ES

Q1
2SC1740S (RS)

Q8,Q9,Q17
DTA114ES

Q2,Q16
2SC1740S (Q)

IC2 TA7361AP

REC 2.0 Vp-p

REC 50 Vp-p

REC 0.6 Vp-p

PB 0.1 Vp-p

REC 0.62 Vp-p

REC 0.44 Vp-p

REC 0.45 Vp-p

REC PB
0.67 Vp-p

REC 0.68 Vp-p

IC4 BA15218N

IC6 BA15218N

Q103
2SC1740S (RS)

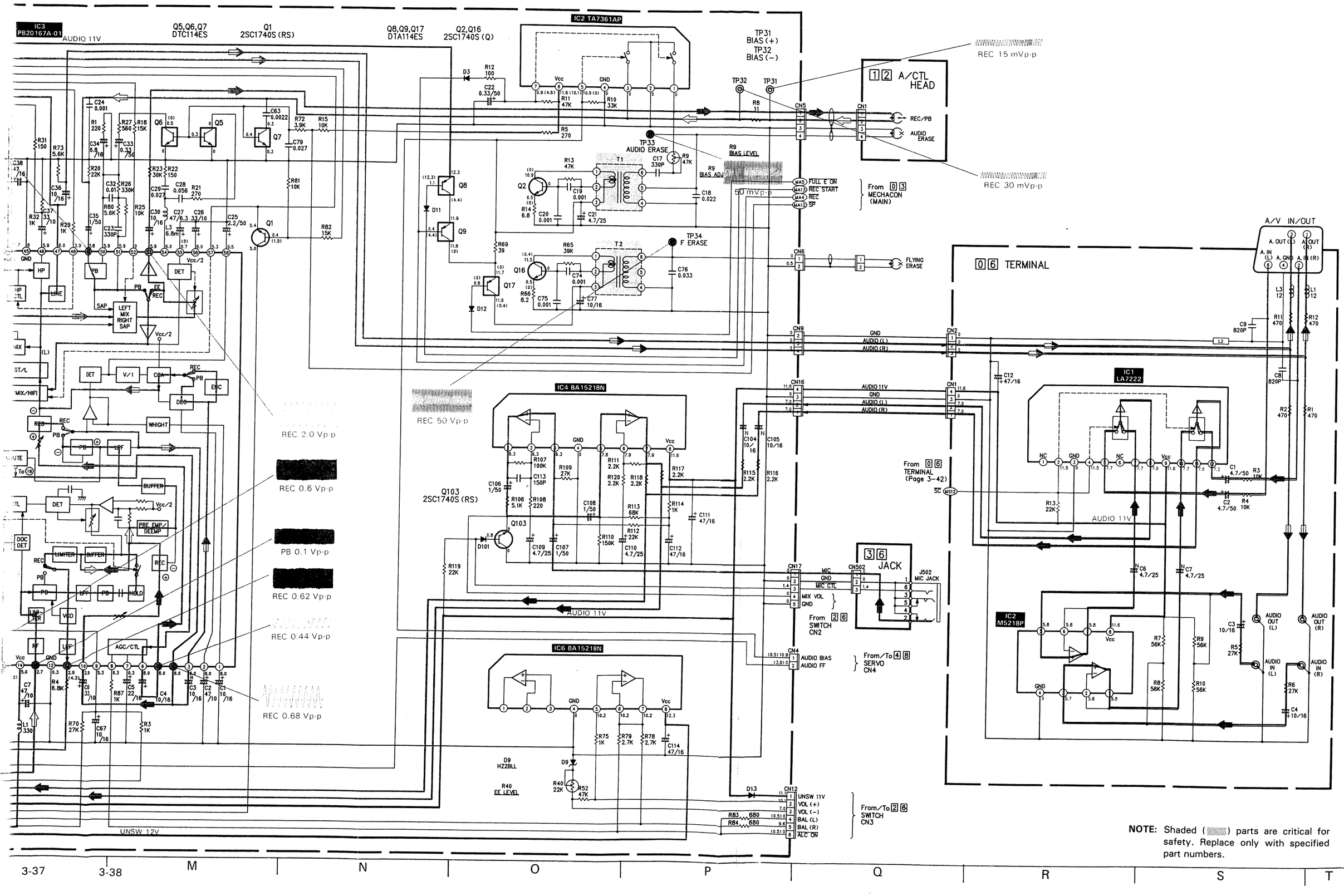
D9
HZ2BLL

R40
EE LEVEL

SWD 5V

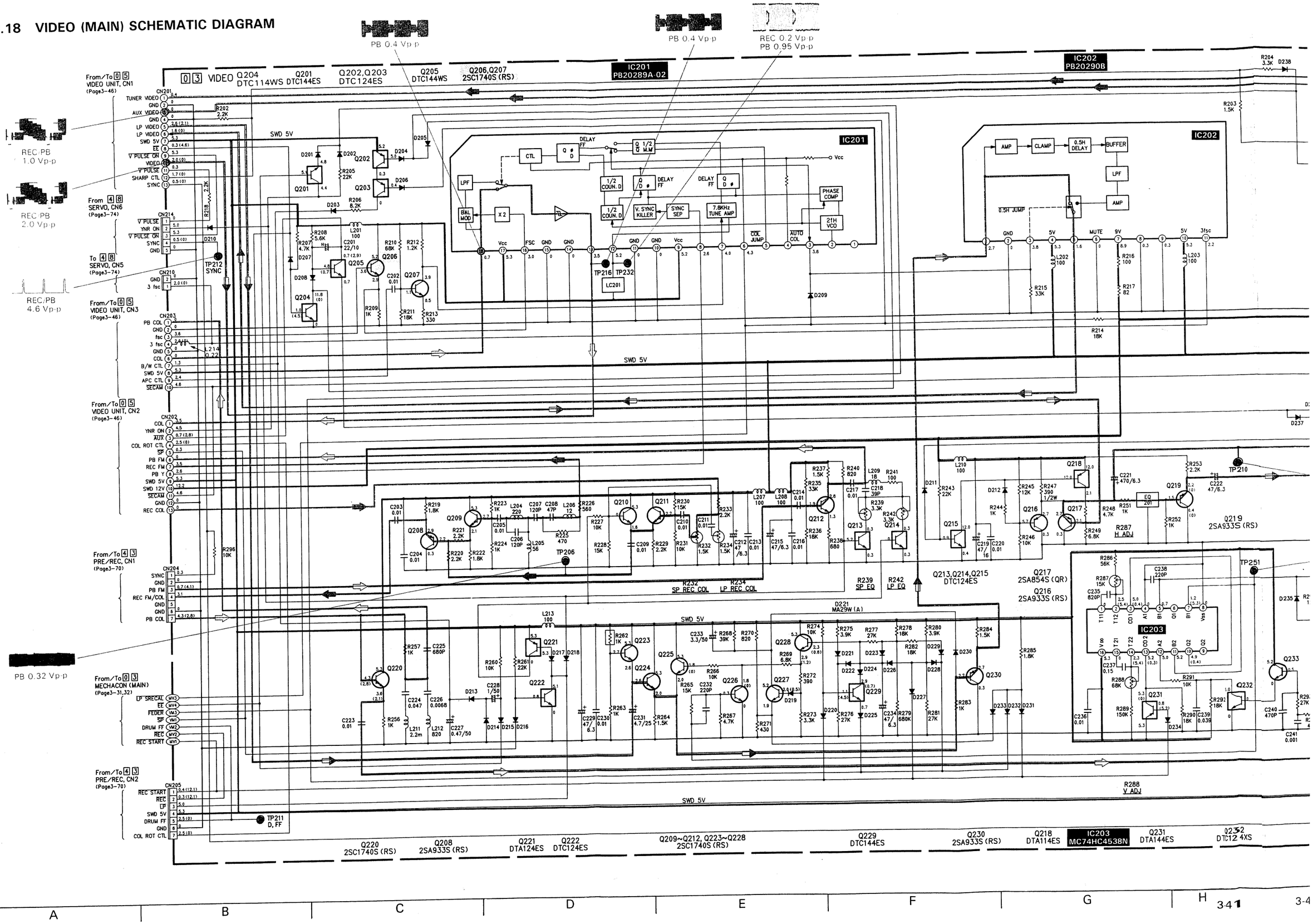
UNSW 12V

I J K L 3-37 3-38 M N O P



NOTE: Shaded (▒) parts are critical for safety. Replace only with specified part numbers.

3.18 VIDEO (MAIN) SCHEMATIC DIAGRAM



PB 0.4 Vp-p

REC 0.2 Vp-p
PB 0.95 Vp-p

IC201
PB20289A-02

IC202
PB20290B

IC201

IC202

IC203
MC74HC4538N

From/To [0][8]
TUNER CTL, CN4
(Page3-54)

CN208
GND
TUNER VIDEO
UNSW 12V
GND
PICTURE MUTE

From [2][6]
SWITCH, CN6
(Page3-66)

CN213
SHRAP CTL
SHRAP MAX
GND
EDIT

CN209
GND
VIDEO
GND
VIDEO

CN4

A/V IN/OUT

VPT/VPS ADAPTER

From/To [2][0]
TIMER, CN301
(Page3-62)

CN7
VPS VIDEO (EG MODEL ONLY)
GND
SRL DATA
SRL CLK
REMOTE

To [0][8]
TUNER CTL
CN3 (Page3-54)

CN6
VPS VIDEO
GND

To [0][6]
TERMINAL
(Page3-39)

[0][6] TERMINAL

To [8][3]
AUTO TRACKING
CN1 (Page3-77)

CN212
SWD 12V
GND
PB FM
GND

From [2][0]
TIMER, CN5
(Page3-61)

CN215
AUX
TEXT
SC

CN5

CN702

REC PB 2.0 Vp-p

REC 5 Vp-p

From/To [0][2]
REGULATOR
CN7 (Page3-28)

CN701
UNSW 5V
UNSW 12V
SWD 5V
SWD 12V
GND

RF CONV

CN703
GND
UNSW 12V
SWD 12V
GND
RF VIDEO

Q701
2SB810H, J

Q209~Q212, Q223~Q228
2SC1740S (RS)

Q229
DTC144ES

Q230
2SA933S (RS)

Q218
DTA114ES

Q231
DTA144ES

Q232
DTC124XS

Q233
2SC1740S (RS)

Q213,Q214,Q215
DTC124ES

Q217
2SA854S (QR)

Q216
2SA933S (RS)

Q219
2SA933S (RS)

R232
SP REC COL

R234
LP REC COL

R239
SP EQ

R242
LP EQ

R287
H ADJ

R288
V ADJ

SWD 5V

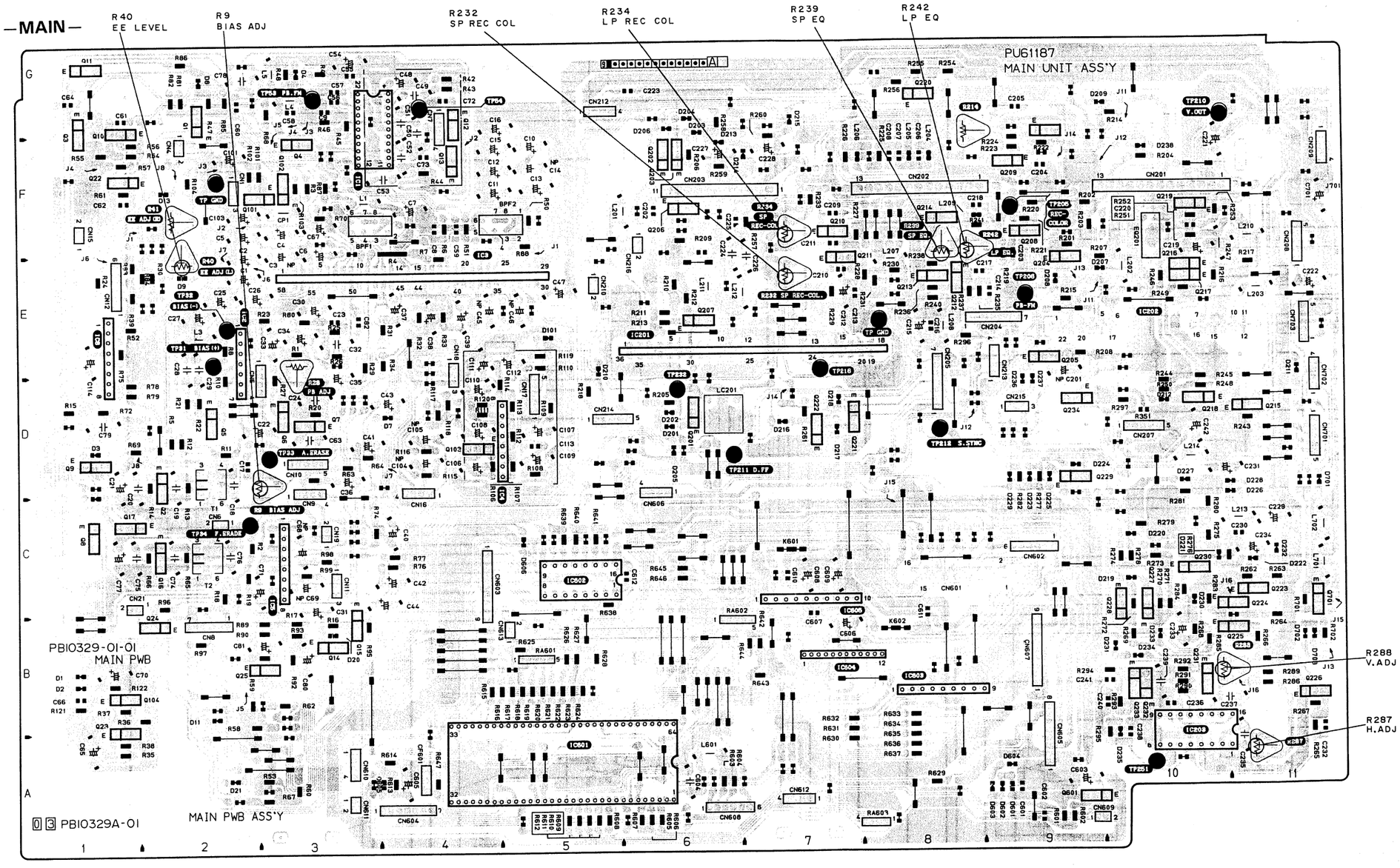
UNSW 12V

GND

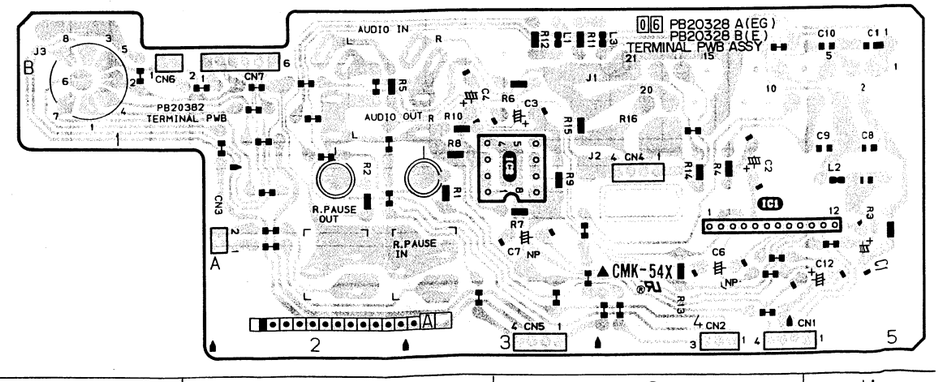
NOTE: Shaded (▒▒) parts are critical for safety. Replace only with specified part numbers.

3.19 MAIN, AND TERMINAL CIRCUIT BOARDS

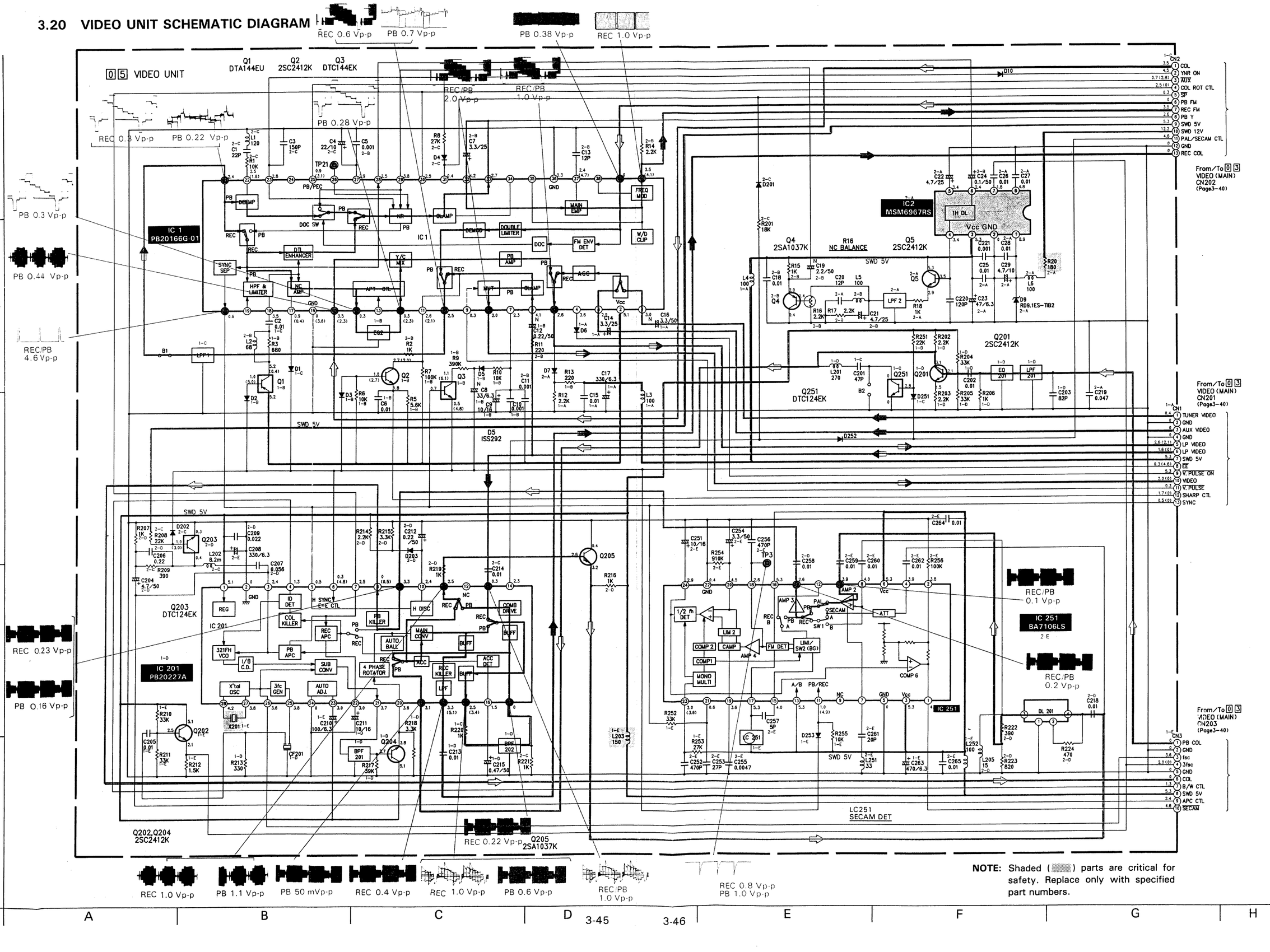
—MAIN—



—TERMINAL—

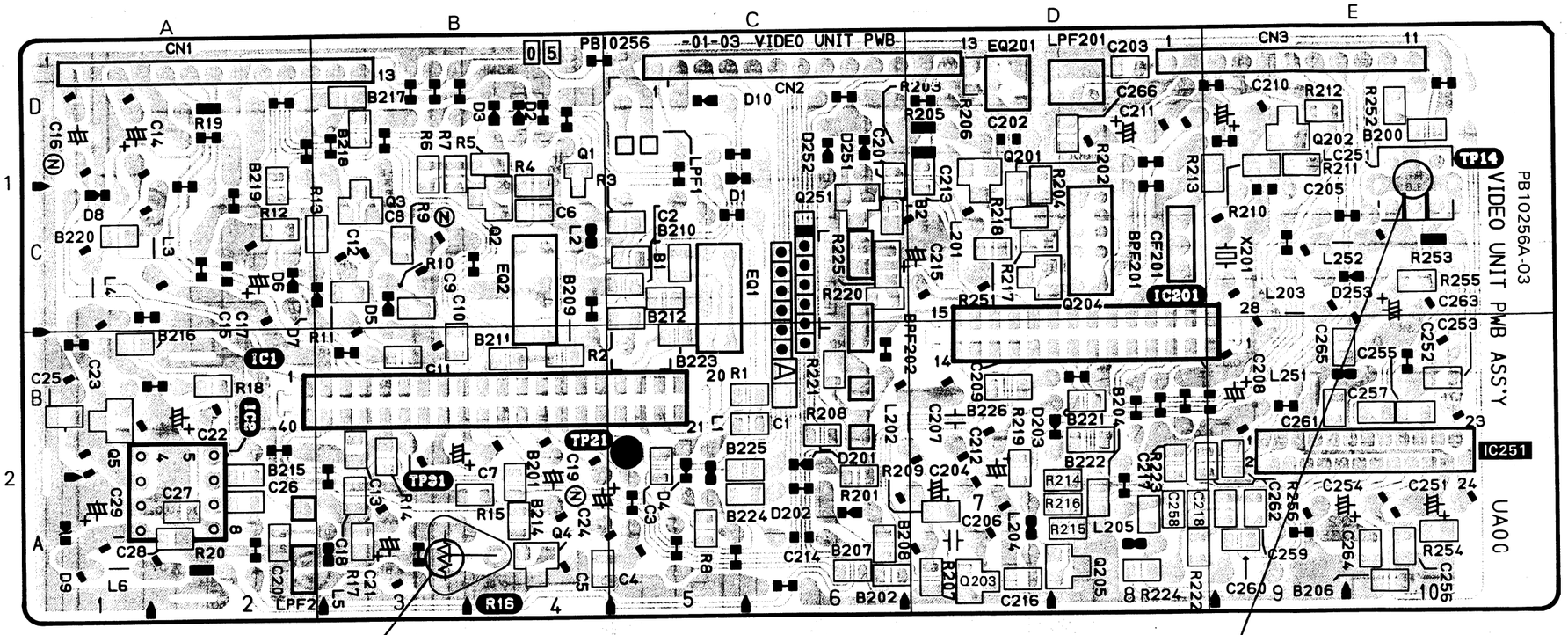


3.20 VIDEO UNIT SCHEMATIC DIAGRAM

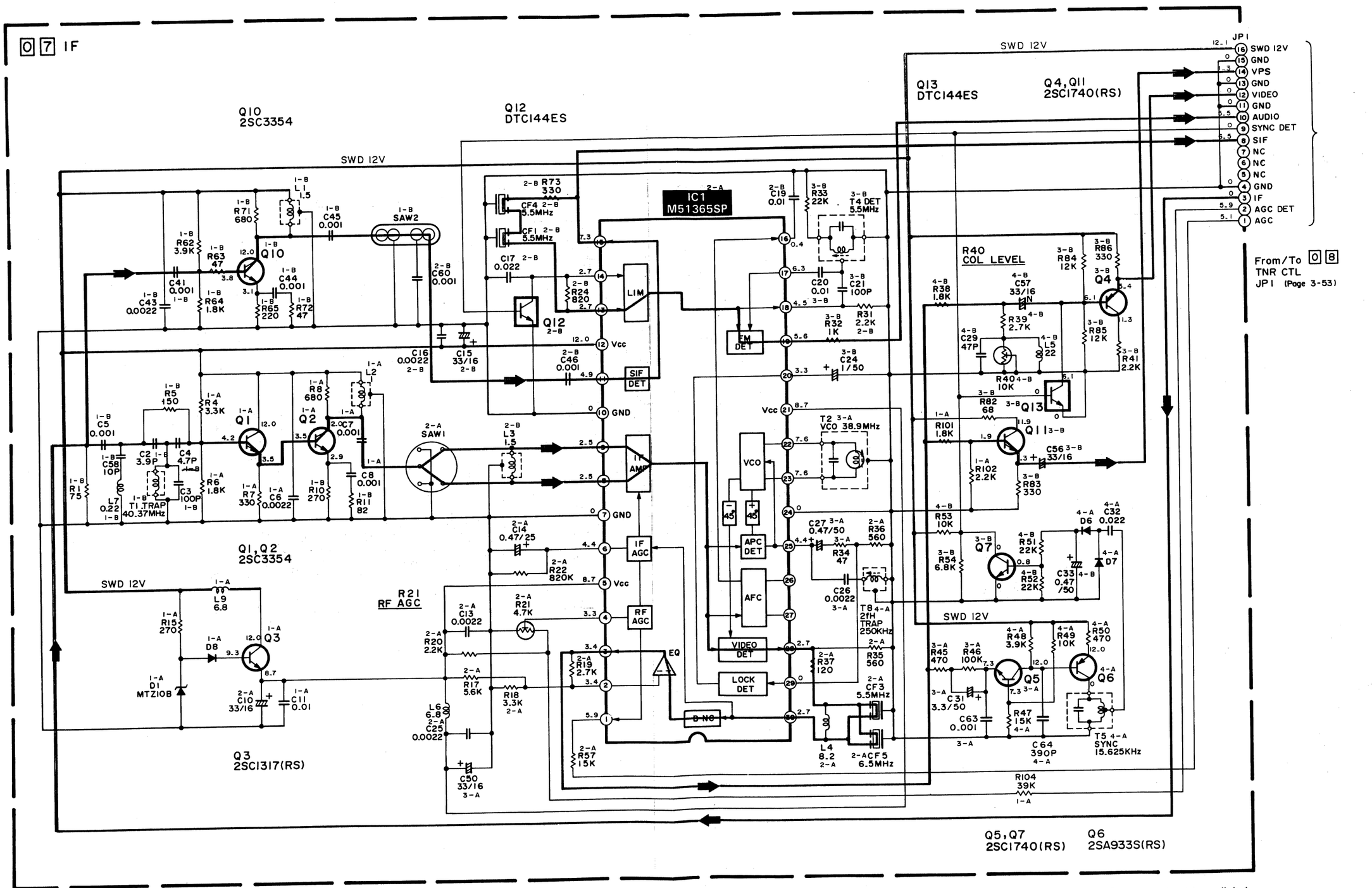


NOTE: Shaded (▒) parts are critical for safety. Replace only with specified part numbers.

3.21 VIDEO UNIT CIRCUIT BOARD

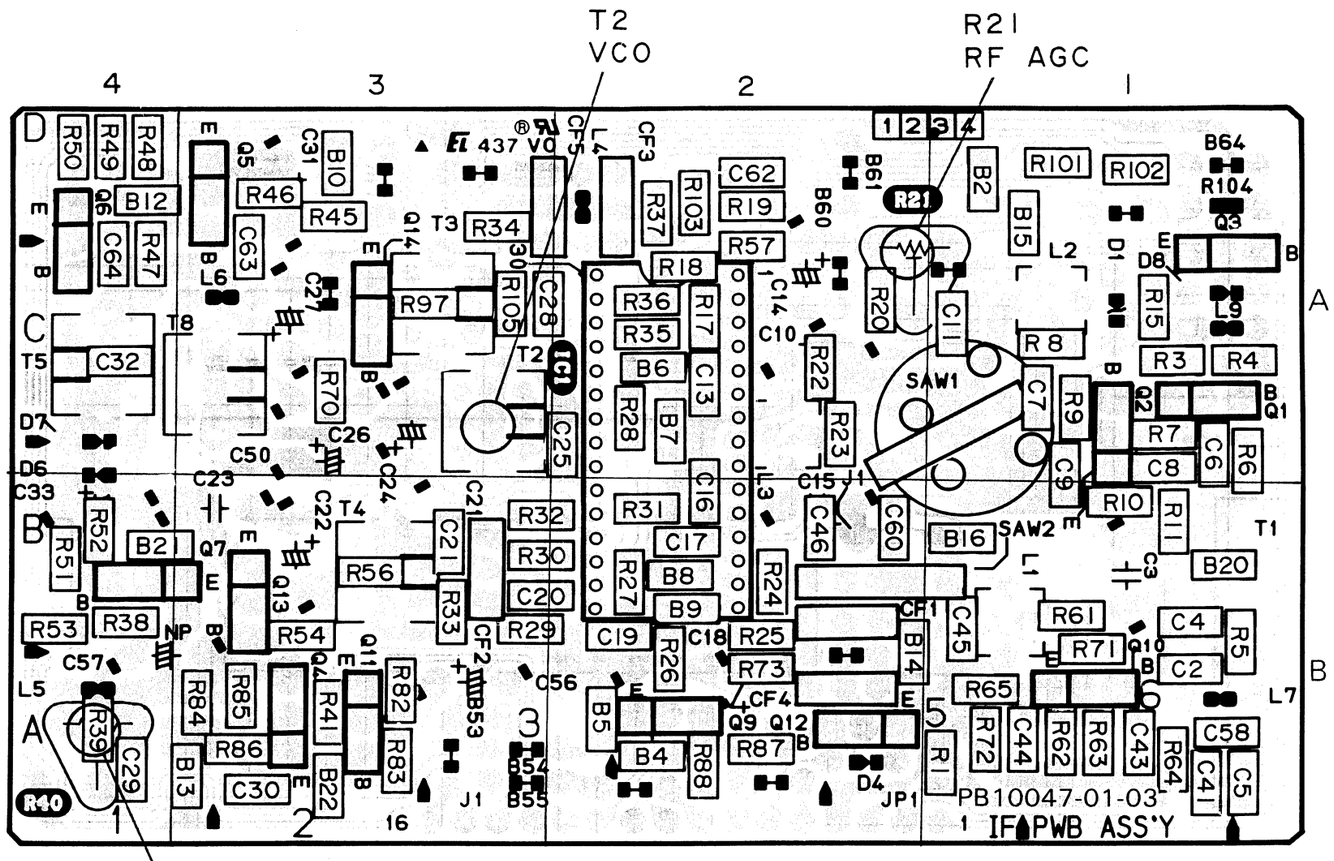


3.22 IF SCHEMATIC DIAGRAM



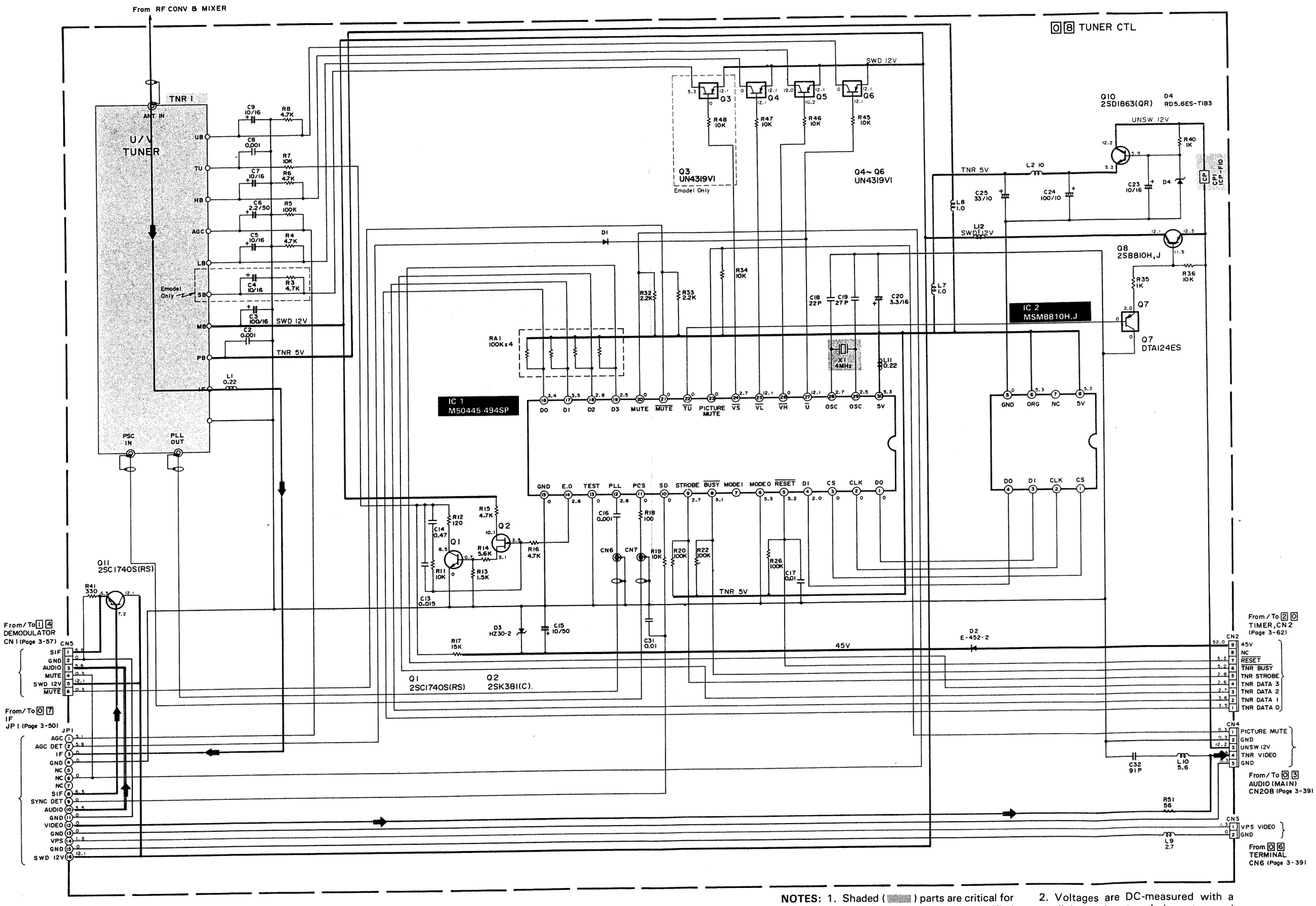
Note: Voltages are DC-measured with a digital voltmeter during stop and tuner mode (3CH).

3.23 IF CIRCUIT BOARD



07 IF BOARD ASSY PB10047AN

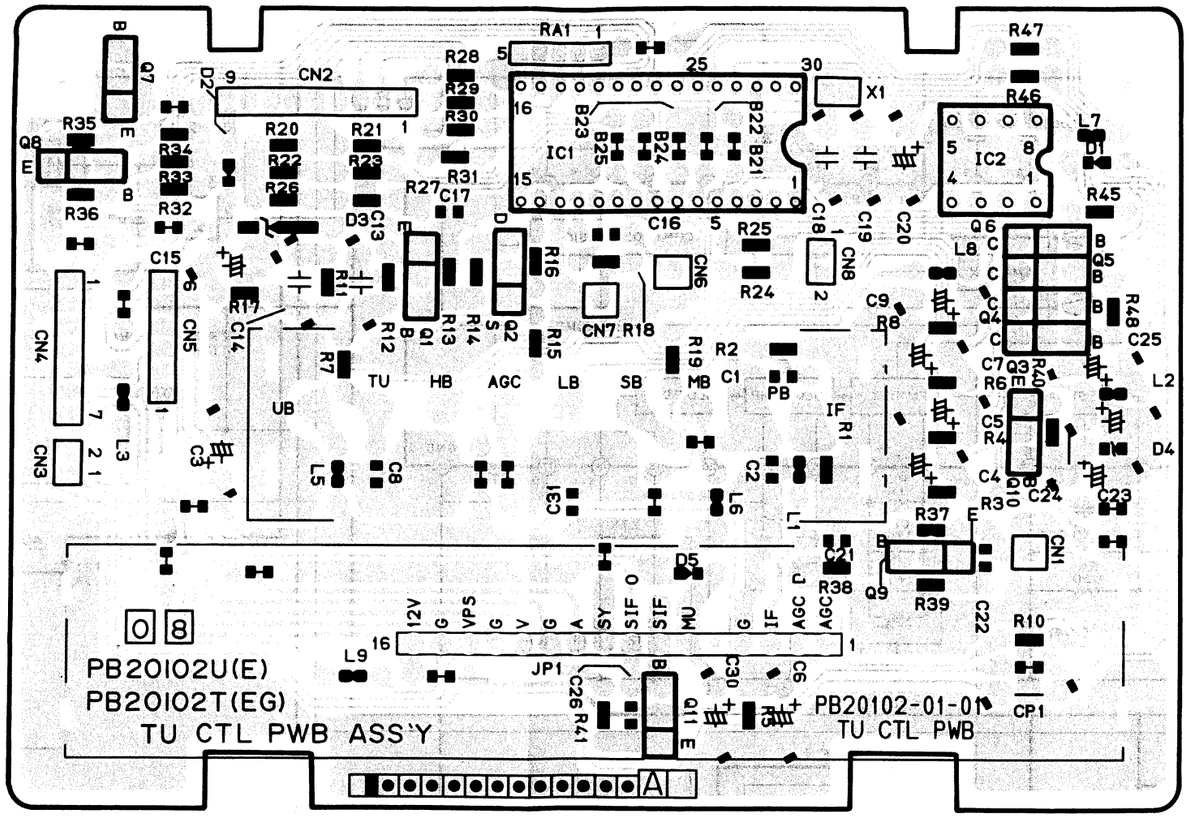
3.24 TUNER CTL SCHEMATIC DIAGRAM



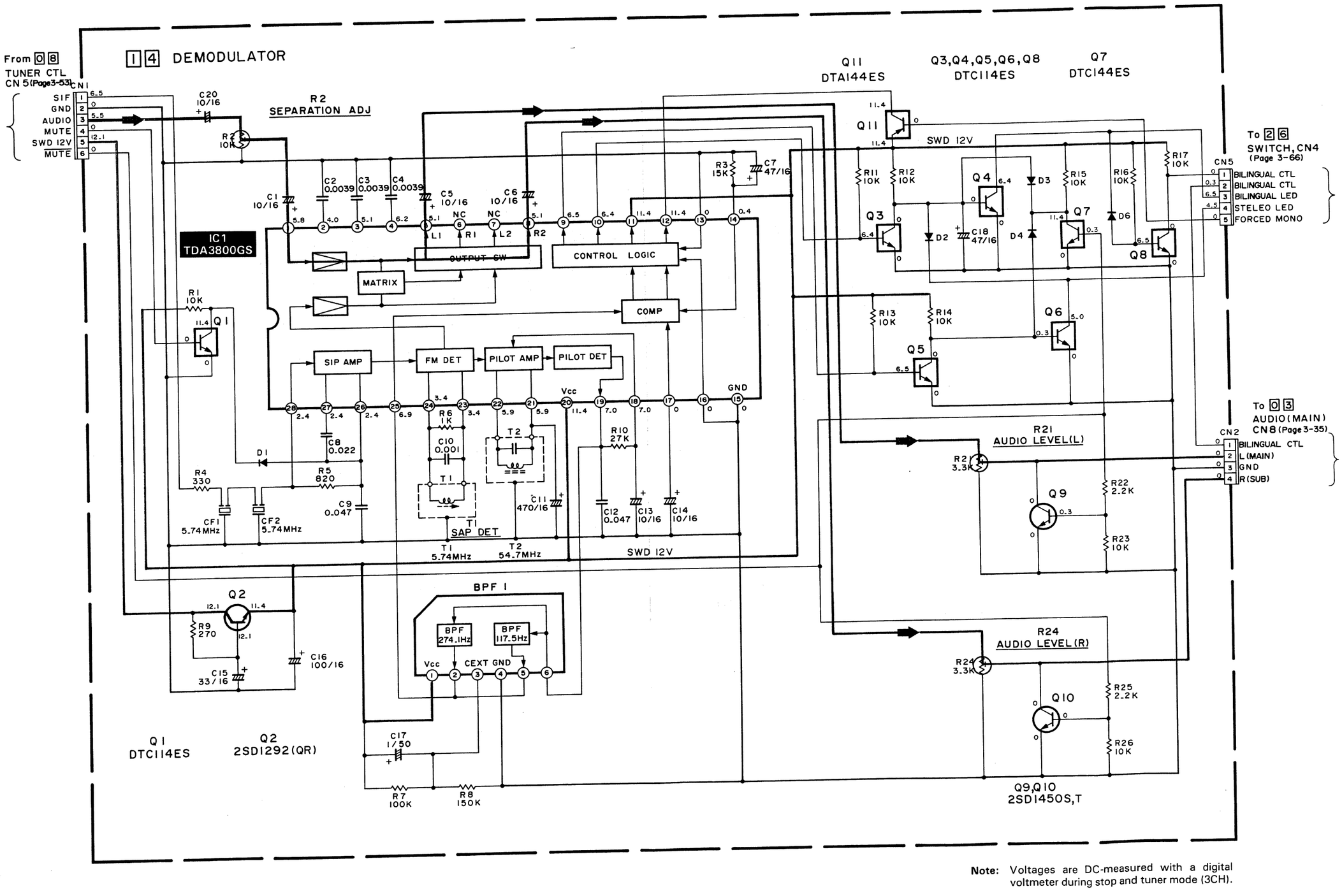
NOTES: 1. Shaded (▒▒) parts are critical for safety. Replace only with specified part numbers.

2. Voltages are DC-measured with a digital voltmeter during stop and tuner mode (3CH).

3.25 TUNER CTL CIRCUIT BOARD

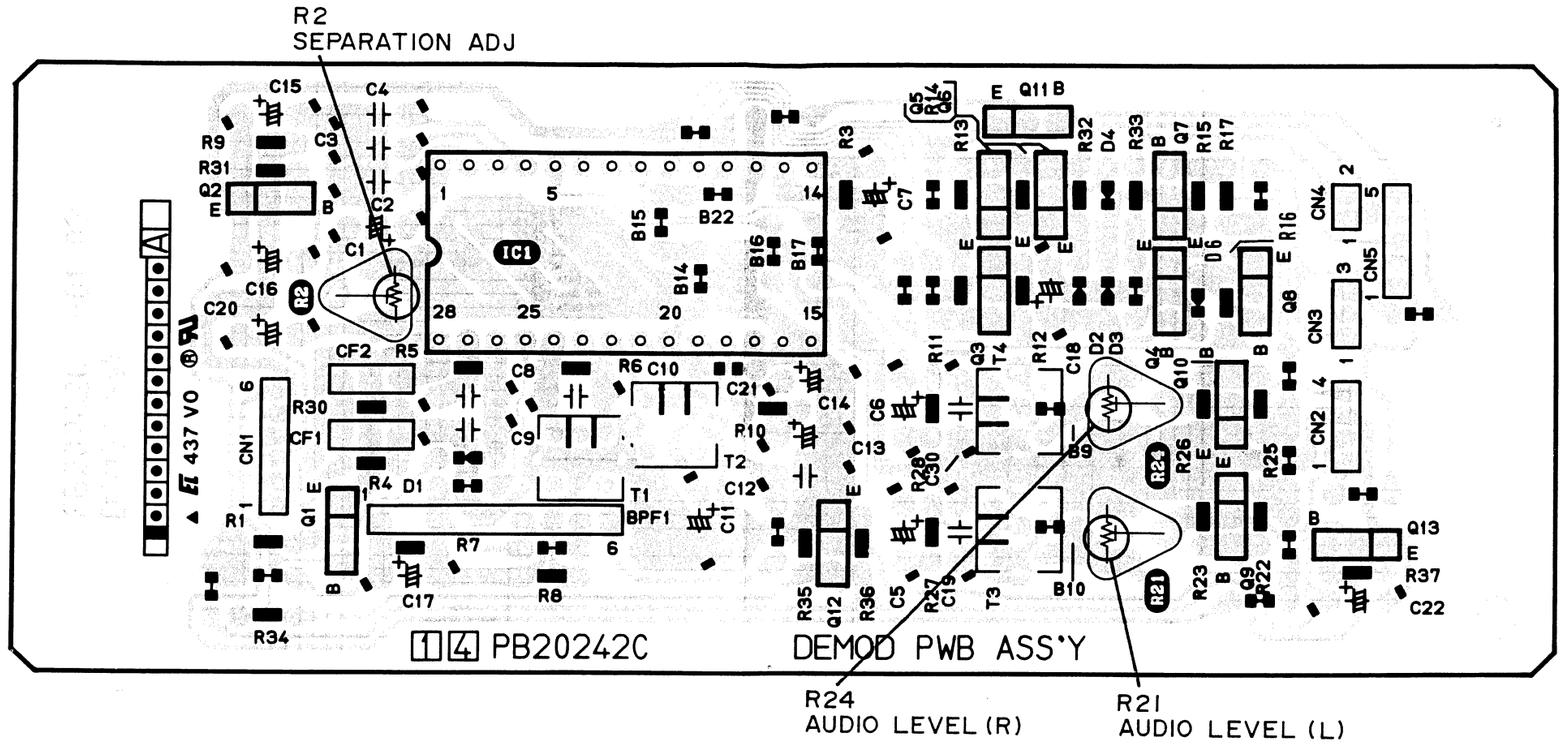


3.26 DEMODULATOR SCHEMATIC DIAGRAM

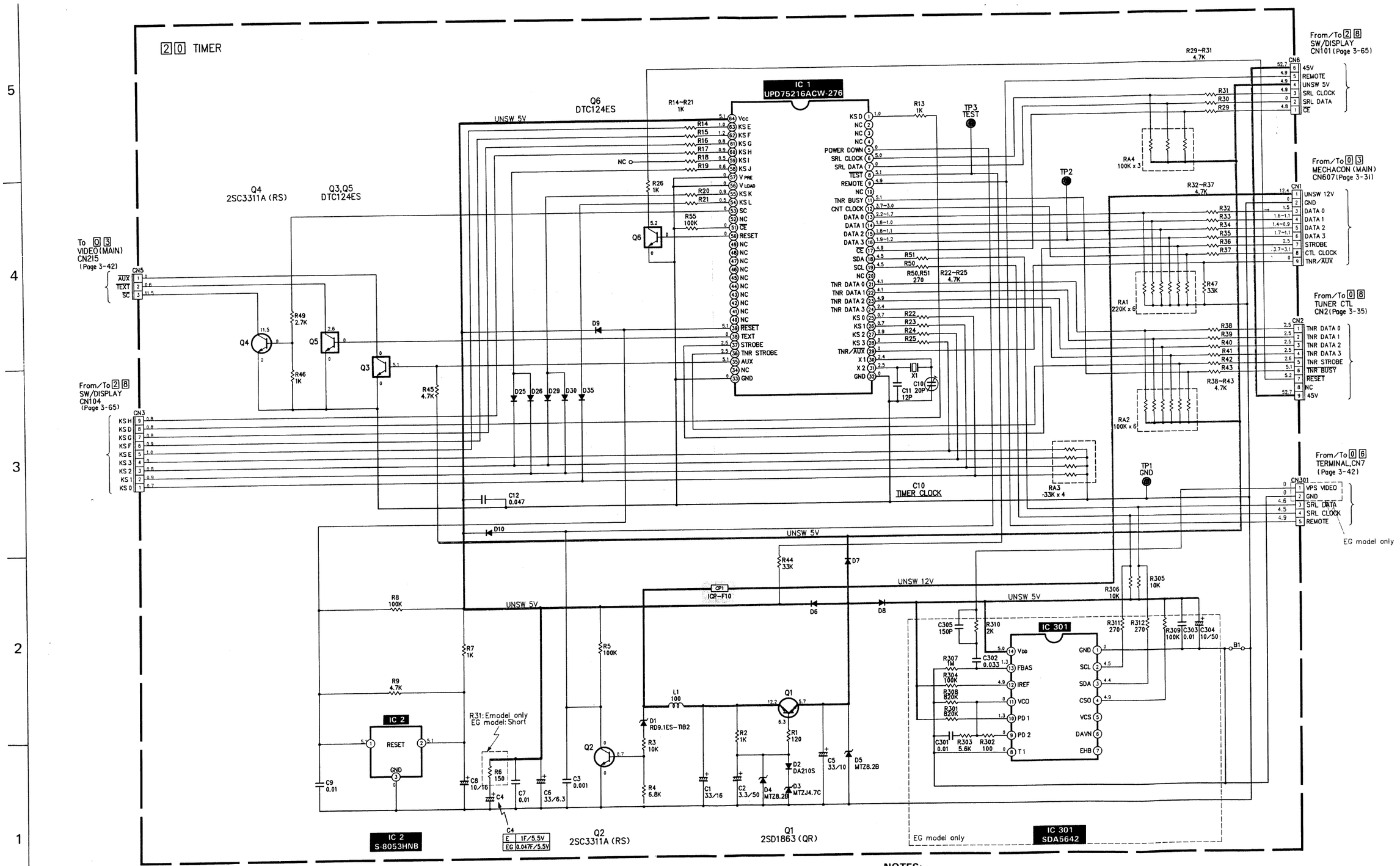


Note: Voltages are DC-measured with a digital voltmeter during stop and tuner mode (3CH).

3.27 DEMODULATOR CIRCUIT BOARD



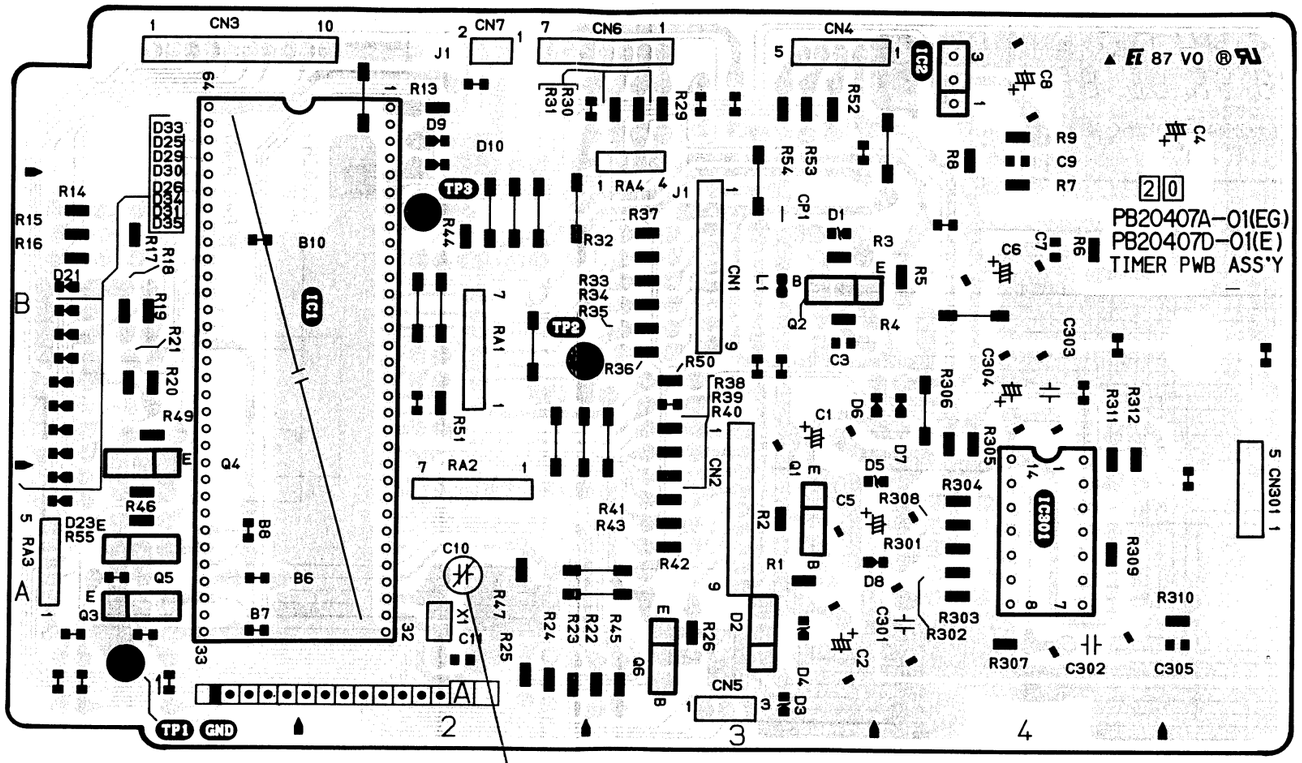
3.28 TIMER SCHEMATIC DIAGRAM



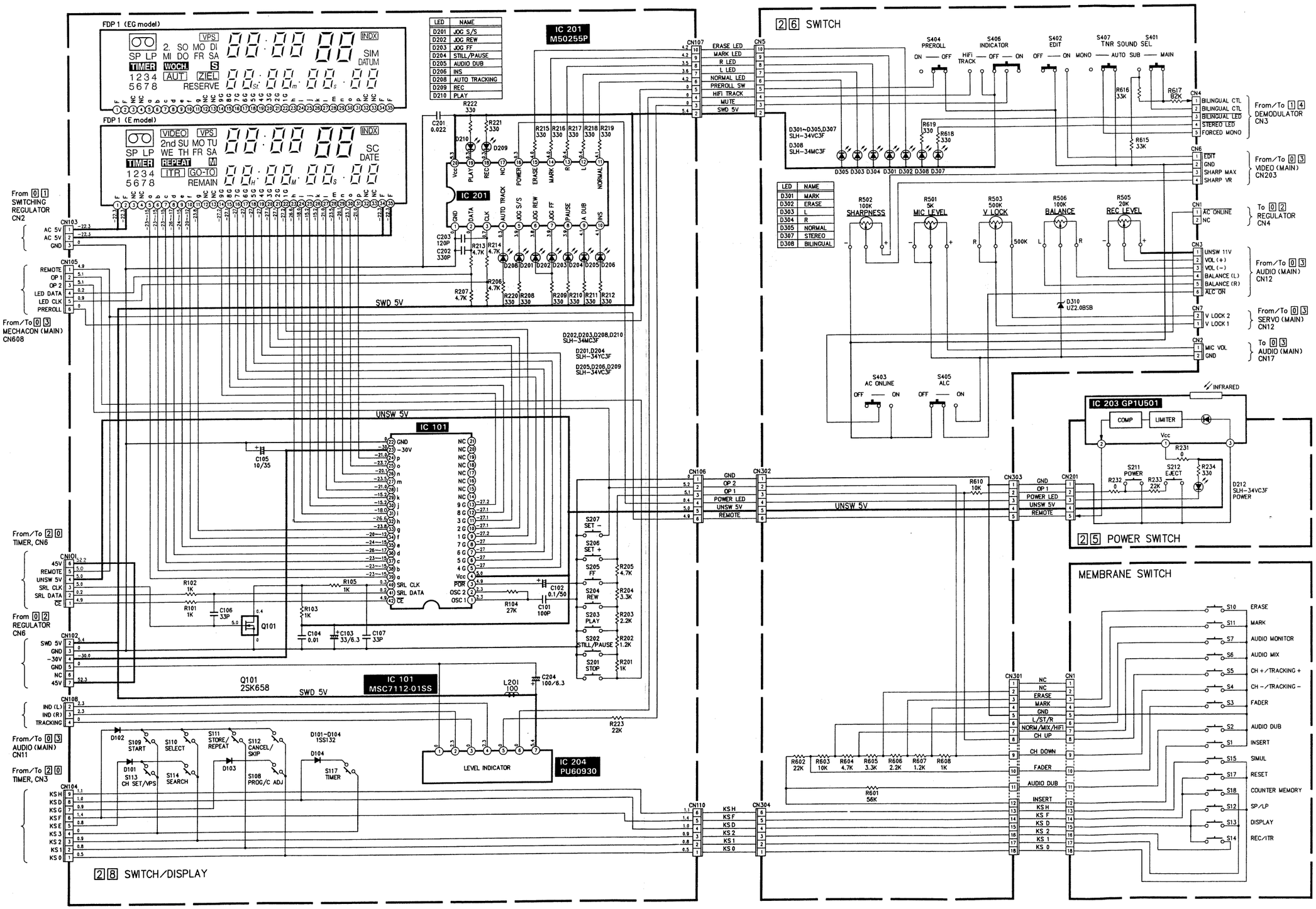
NOTES:

1. Shaded (▒) parts are critical for safety. Replace only with specified part numbers.
2. Voltages are DC-measured with a digital voltmeter during stop mode.

3.29 TIMER CIRCUIT BOARD



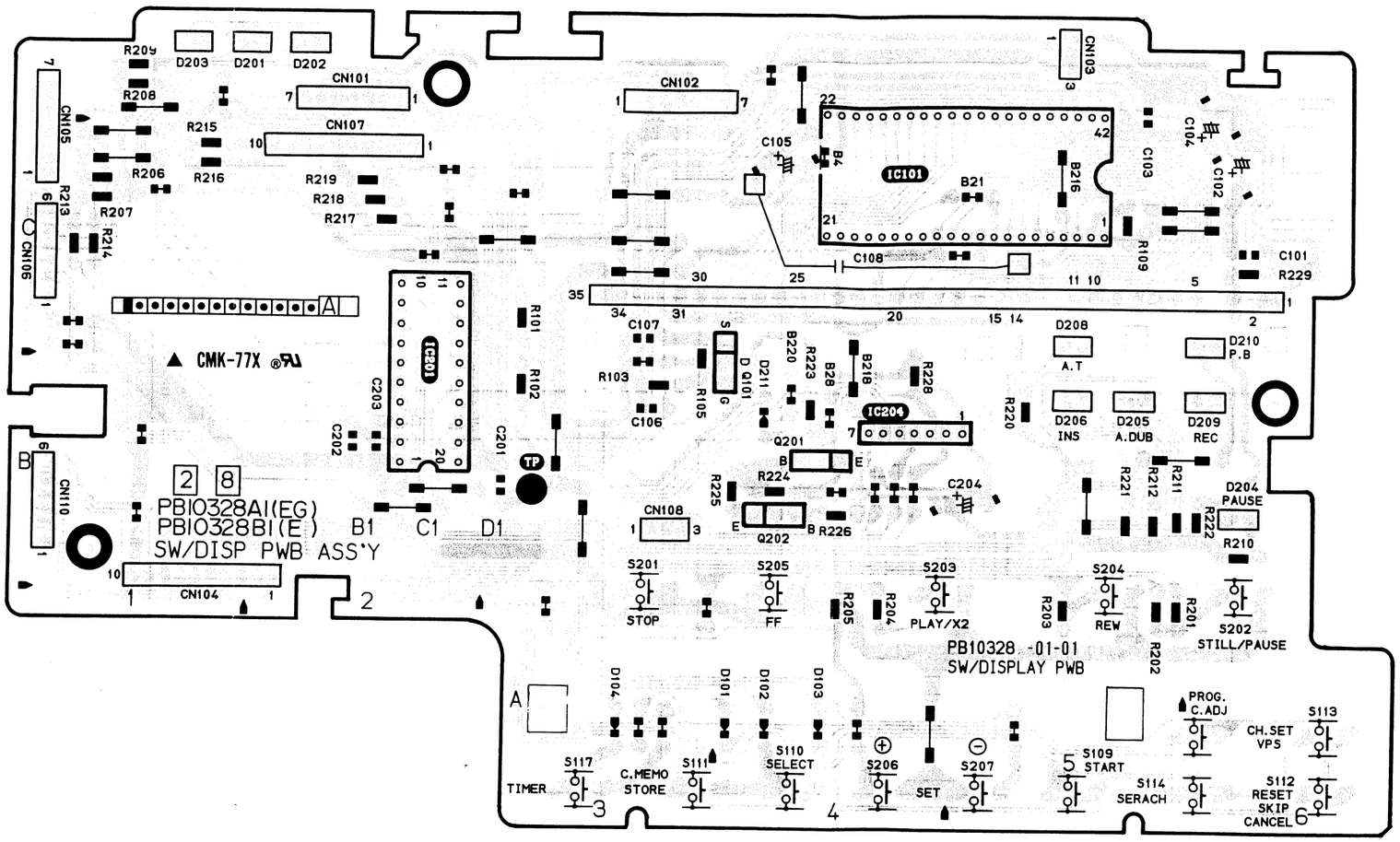
3.30 SWITCH, SWITCH/DISPLAY AND POWER SWITCH SCHEMATIC DIAGRAMS



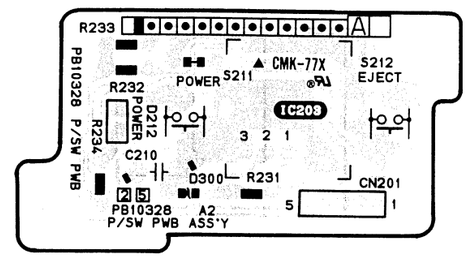
NOTE: Voltages are DC-measured with a digital voltmeter during stop mode.

3.31 SWITCH, SWITCH/DISPLAY, JACK AND POWER SWITCH CIRCUIT BOARDS

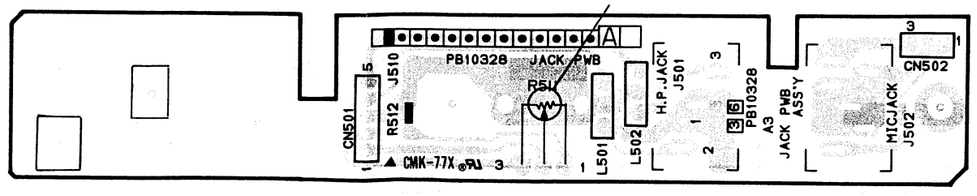
—SWITCH/DISPLAY—



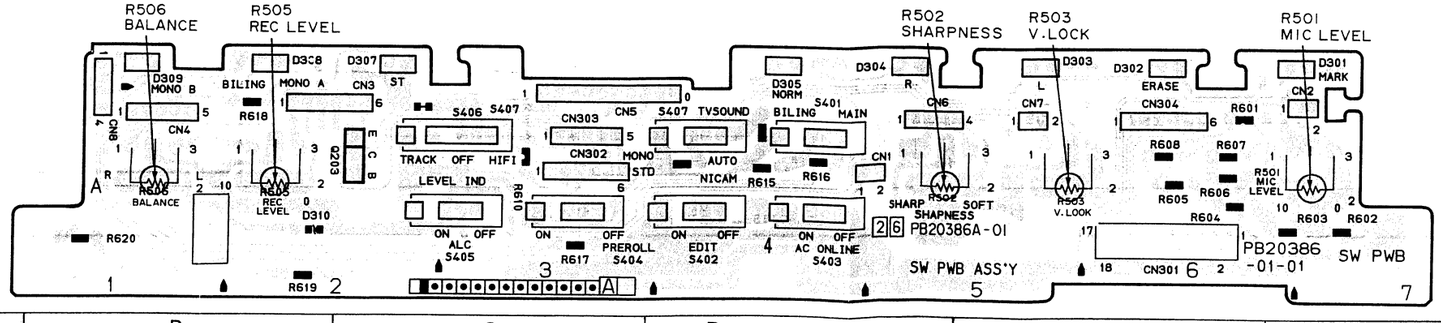
—POWER SWITCH—



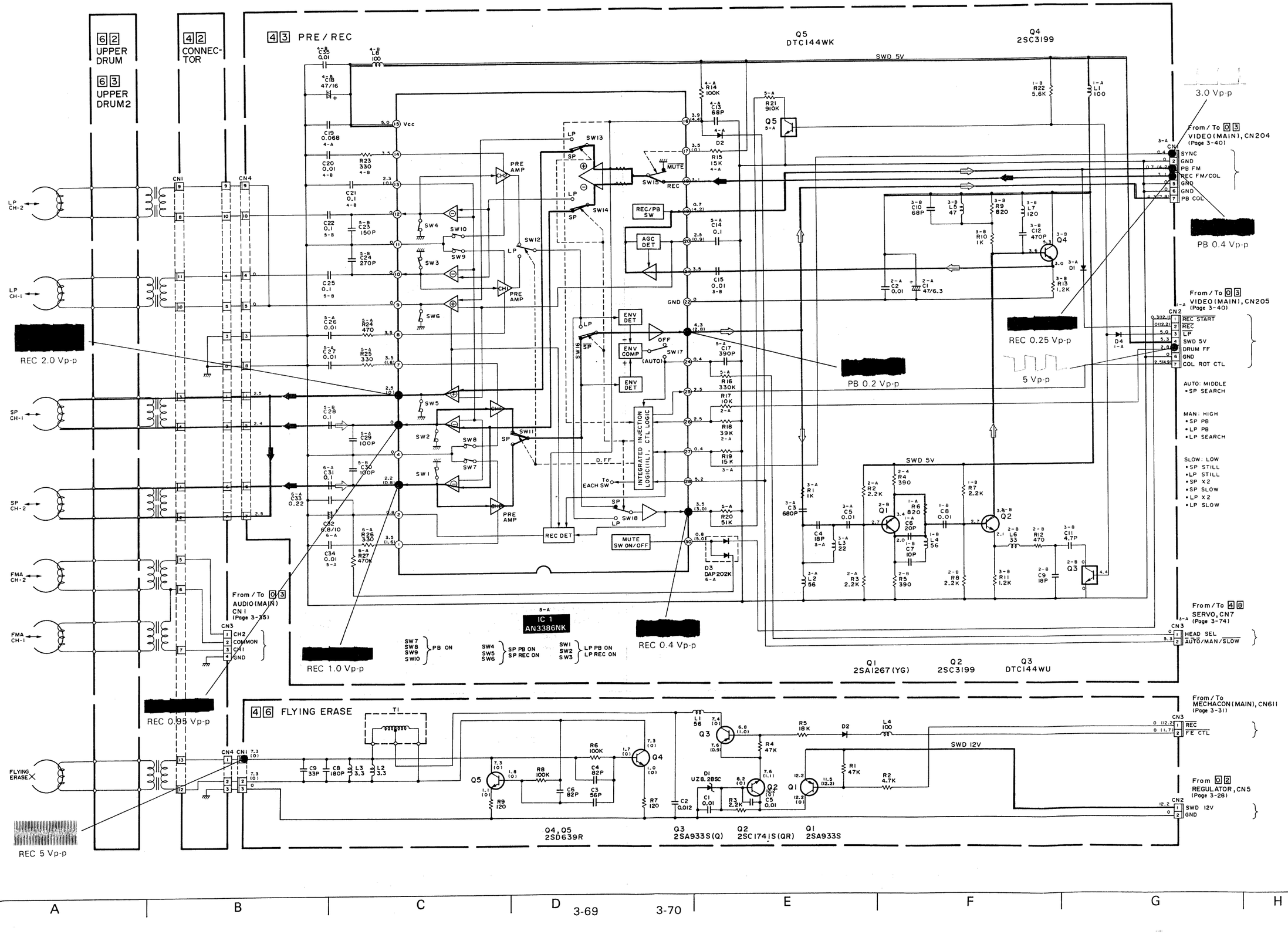
—JACK—



—SWITCH—



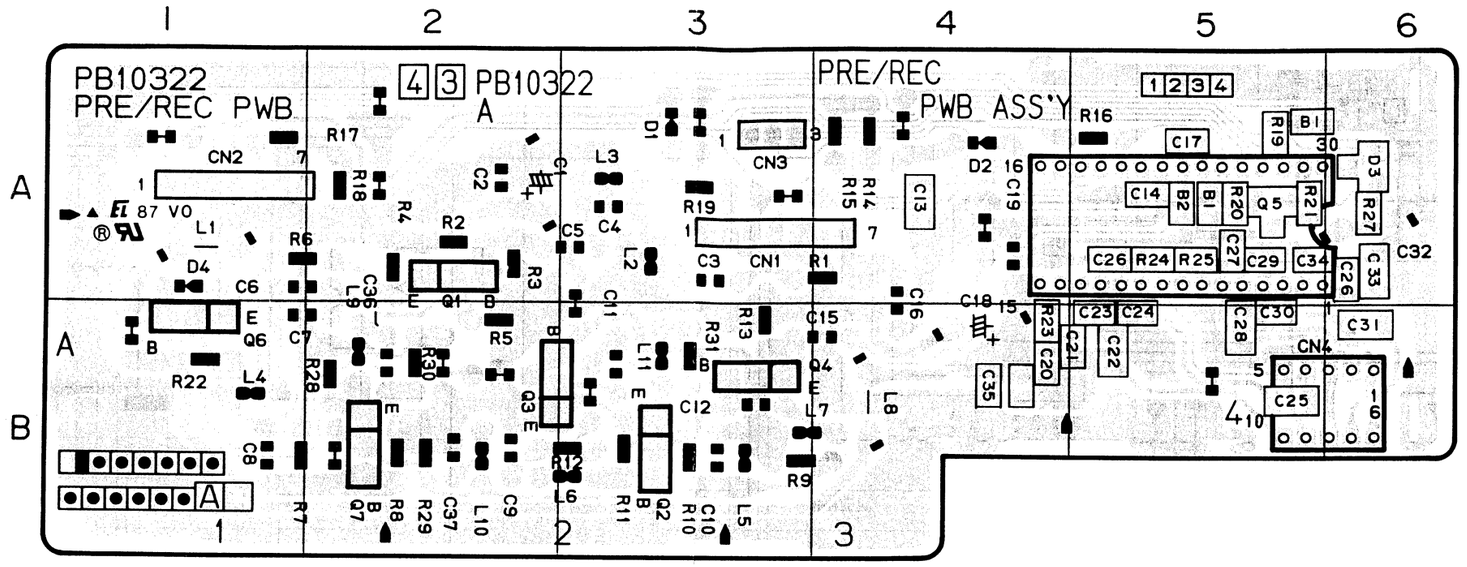
3.32 PRE/REC AND FLYING ERASE SCHEMATIC DIAGRAMS



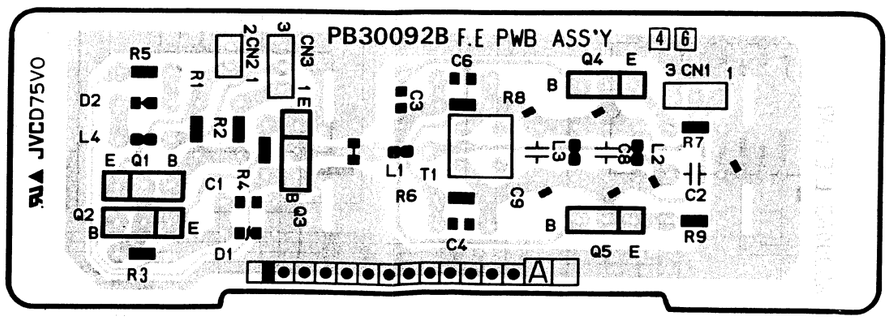
3-69 3-70

3.33 PRE/REC AND FLYING ERASE CIRCUIT BOARDS

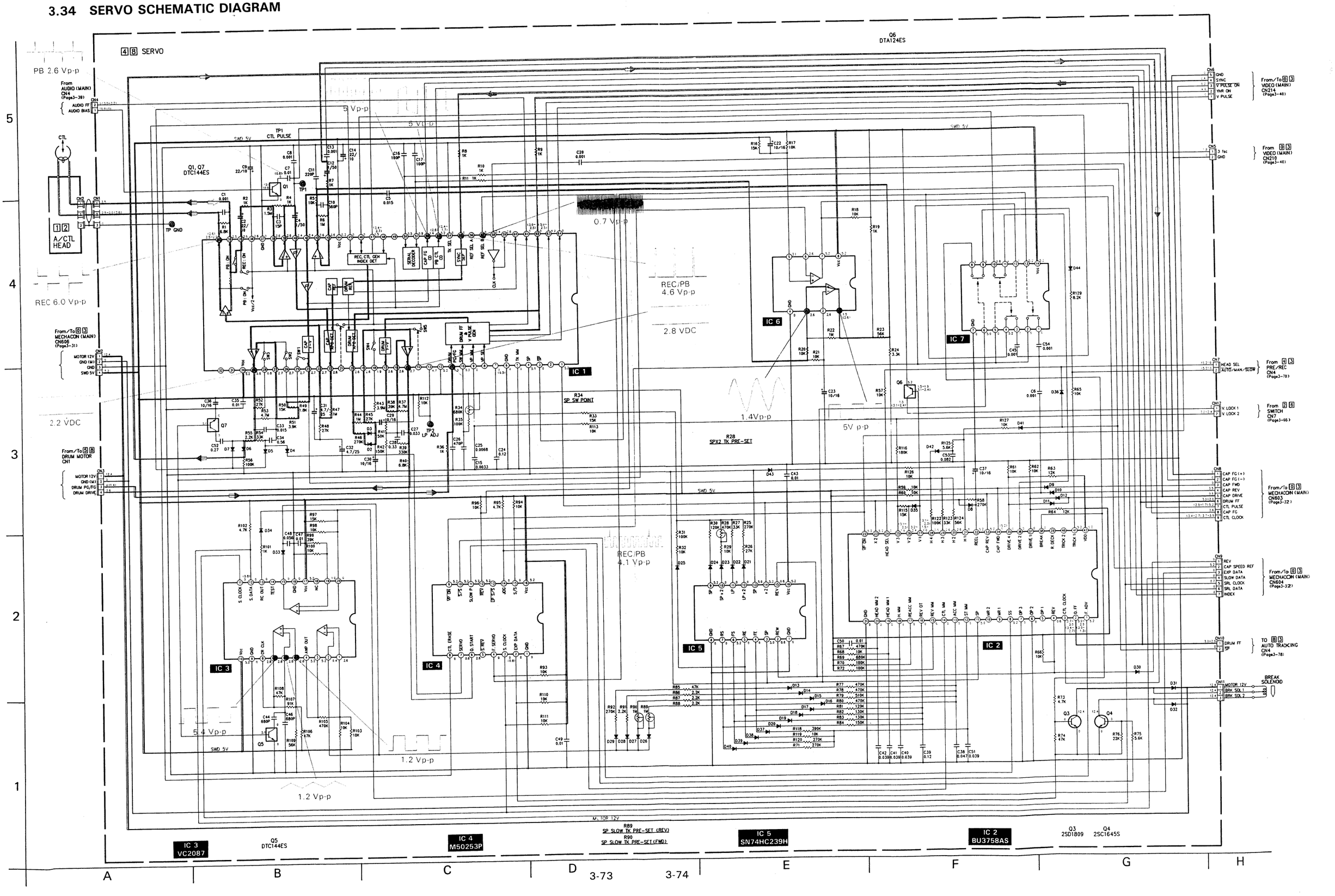
—PRE/REC—



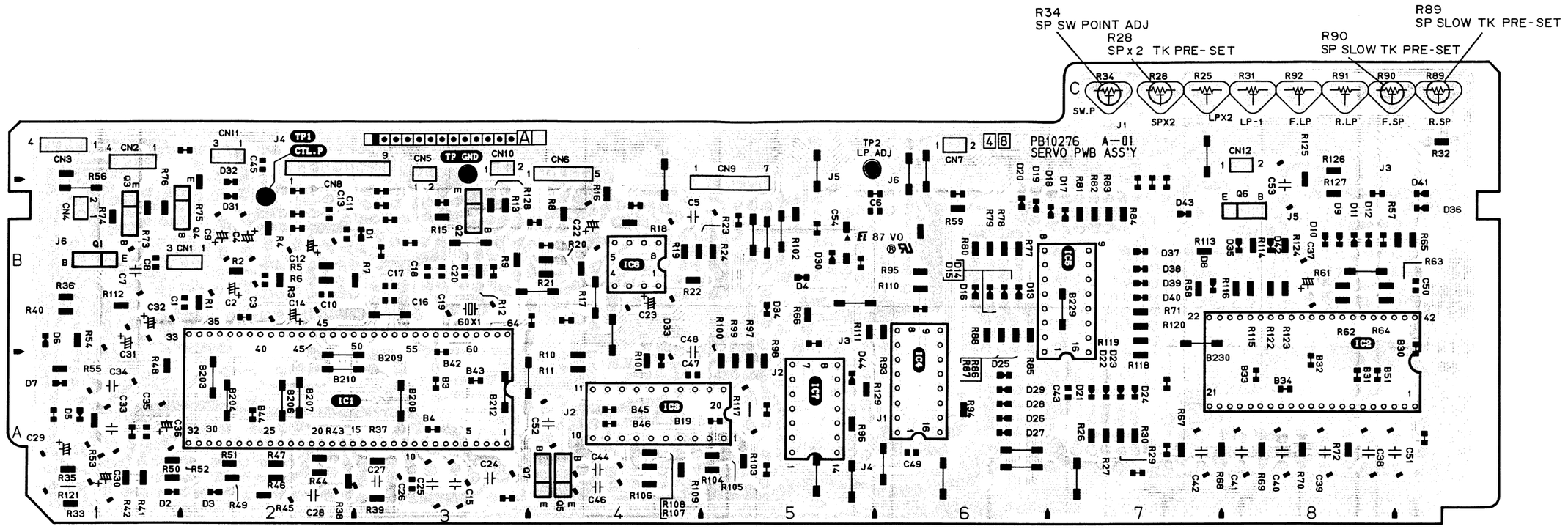
—FLYING ERASE—



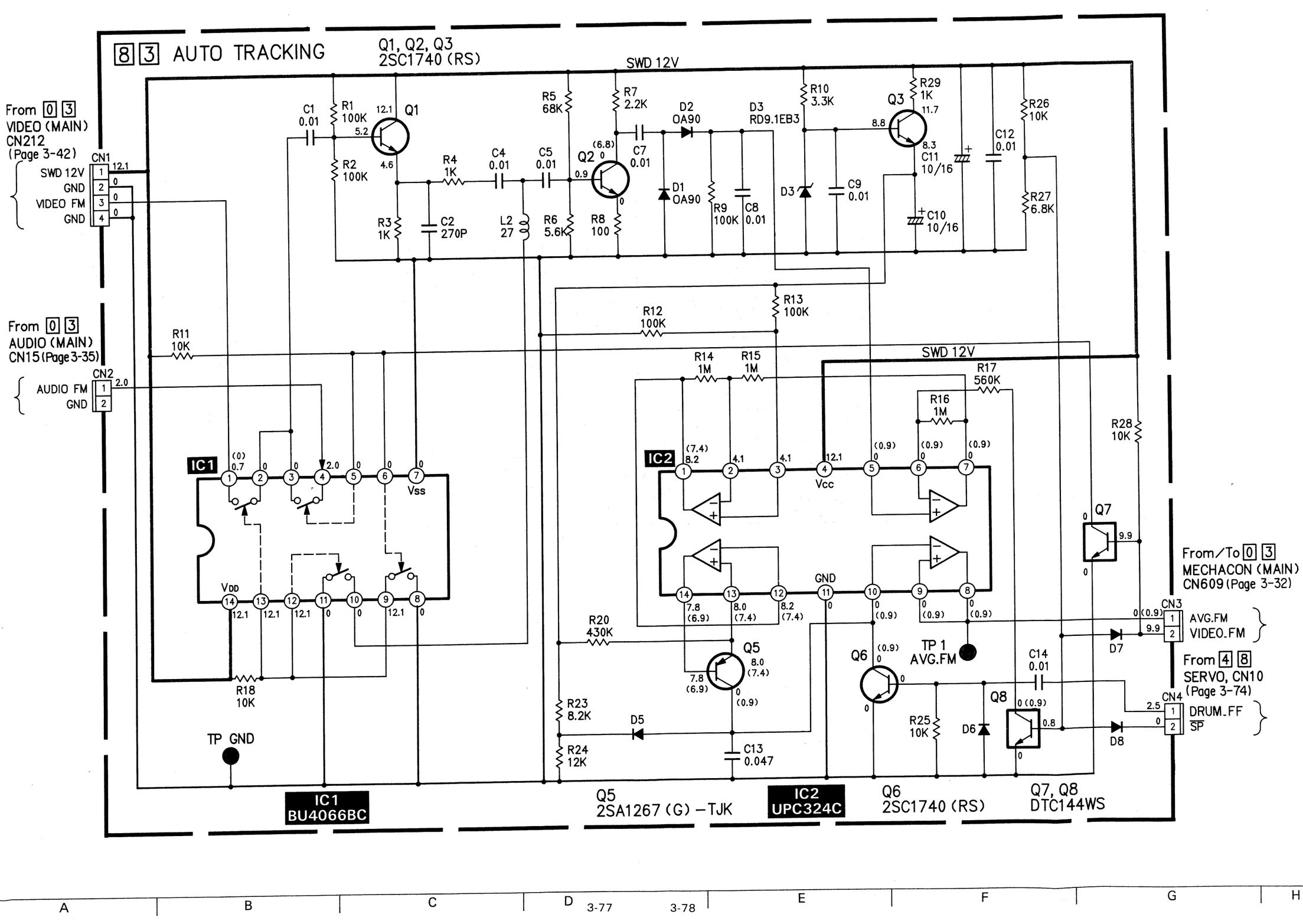
3.34 SERVO SCHEMATIC DIAGRAM



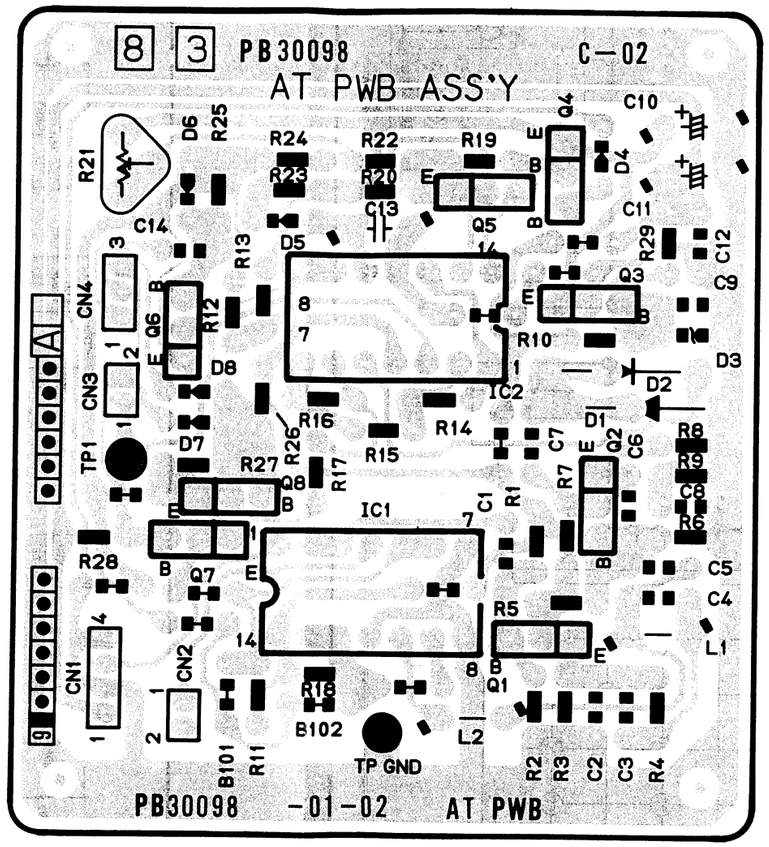
3.35 SERVO CIRCUIT BOARD



3.36 AUTO TRACKING SCHEMATIC DIAGRAM

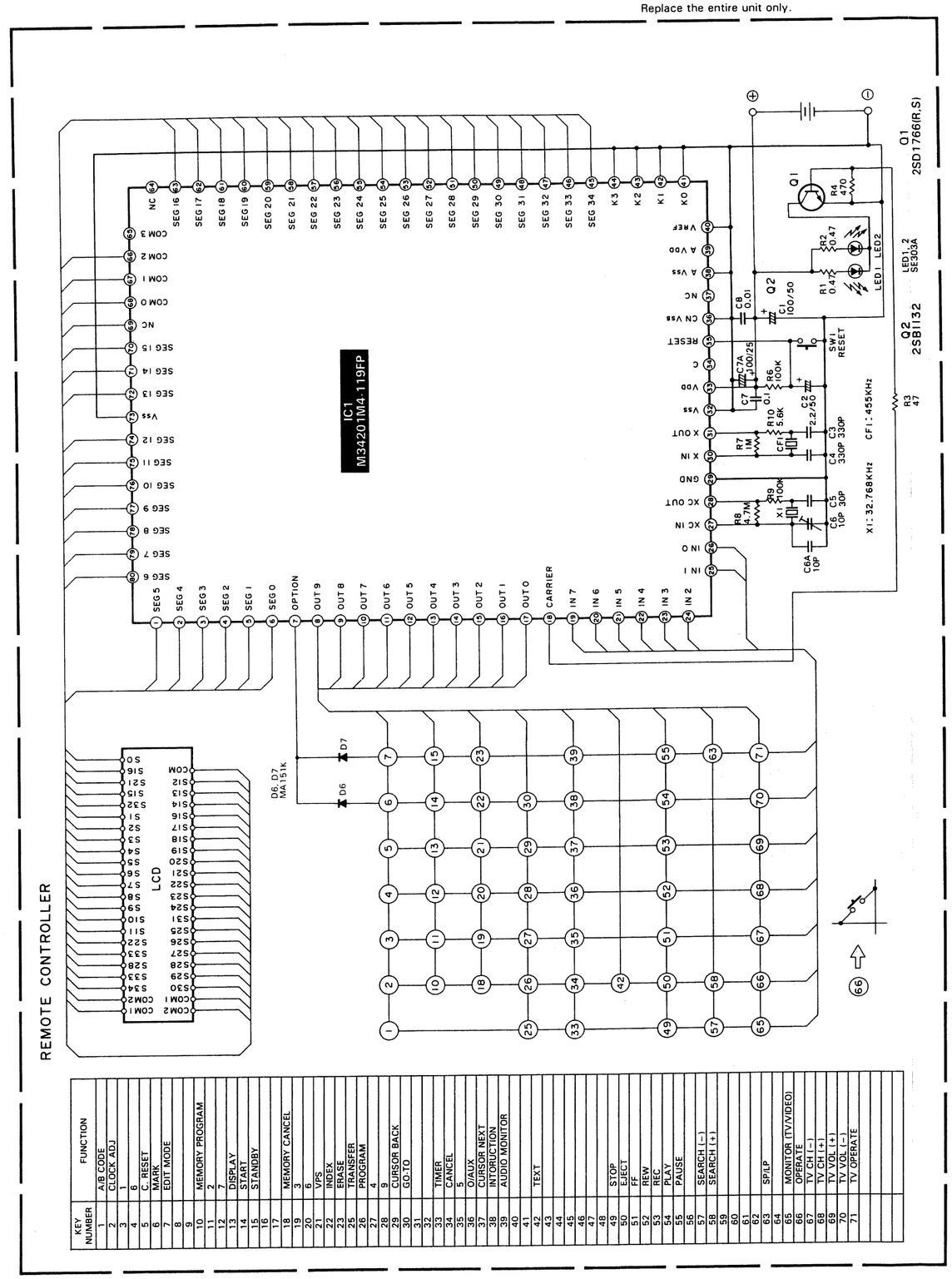


3.37 AUTO TRACKING CIRCUIT BOARD



3.38 REMOTE CONTROL SCHEMATIC DIAGRAM

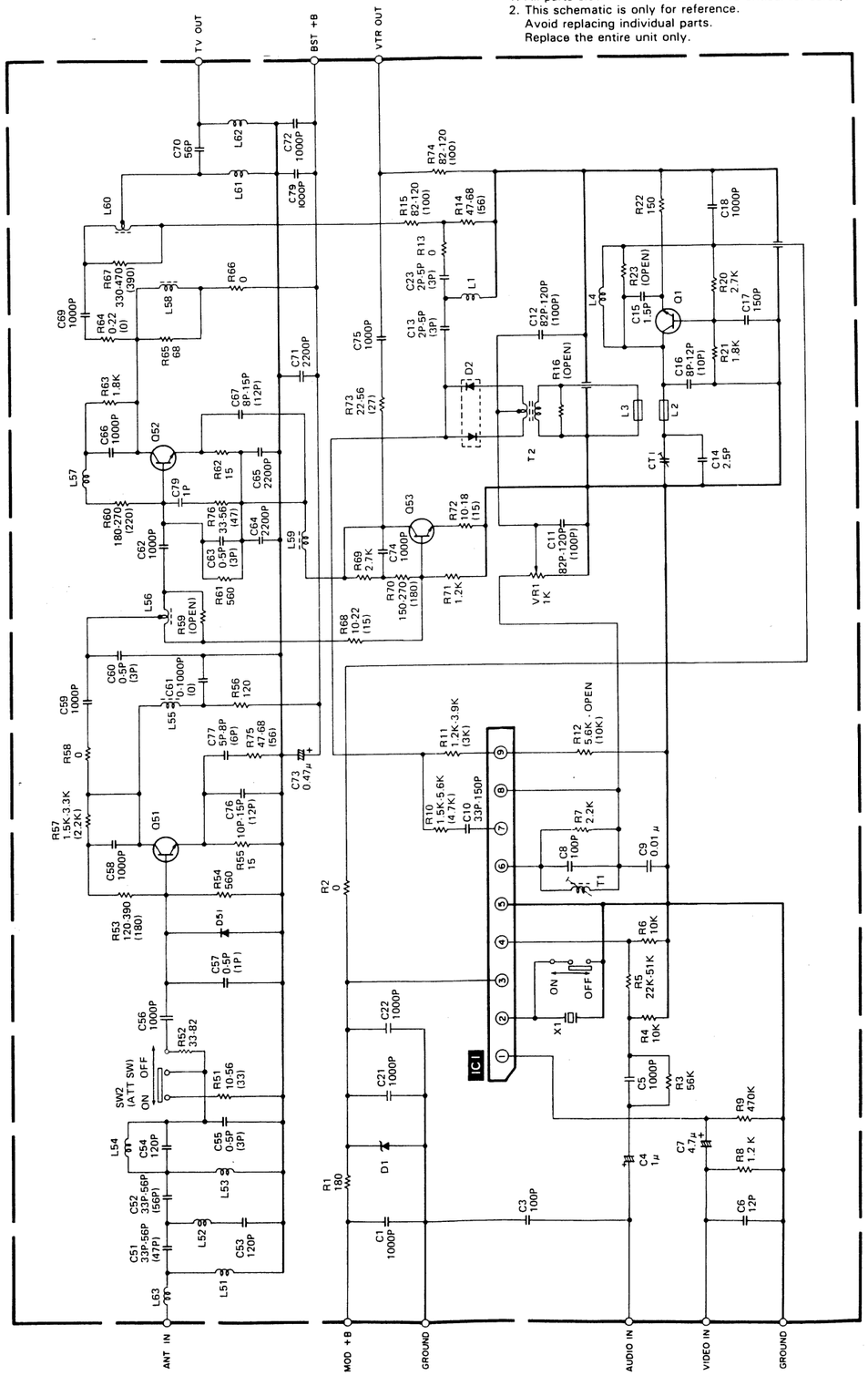
NOTES:
1. All parts shown in this schematic are critical for safety.
2. This schematic is only for reference.
   Avoid replacing individual parts.
   Replace the entire unit only.



KEY NUMBER	FUNCTION
1	A/B CODE
2	CLOCK ADJ
3	8
4	C. RESET
5	MARK
6	EDIT MODE
7	
8	
9	MEMORY PROGRAM
10	2
11	7
12	DISPLAY
13	START
14	STANDBY
15	
16	
17	MEMORY CANCEL
18	3
19	6
20	VPS
21	INDEX
22	ERASE
23	TRANSFER
24	PROGRAM
25	4
26	9
27	CURSOR BACK
28	GO-TO
29	
30	
31	TIMER
32	CANCEL
33	5
34	O/AUX
35	CURSOR NEXT
36	INTORUCTION
37	AUDIO MONITOR
38	
39	
40	TEXT
41	
42	
43	
44	
45	
46	
47	
48	STOP
49	EJECT
50	FF
51	REW
52	REC
53	PLAY
54	PAUSE
55	
56	
57	SEARCH (–)
58	SEARCH (+)
59	
60	
61	
62	
63	SP/LP
64	
65	MONITOR (TV/VIDEO)
66	OPERATE
67	TV CH (–)
68	TV CH (+)
69	TV VOL (+)
70	TV VOL (–)
71	TV OPERATE

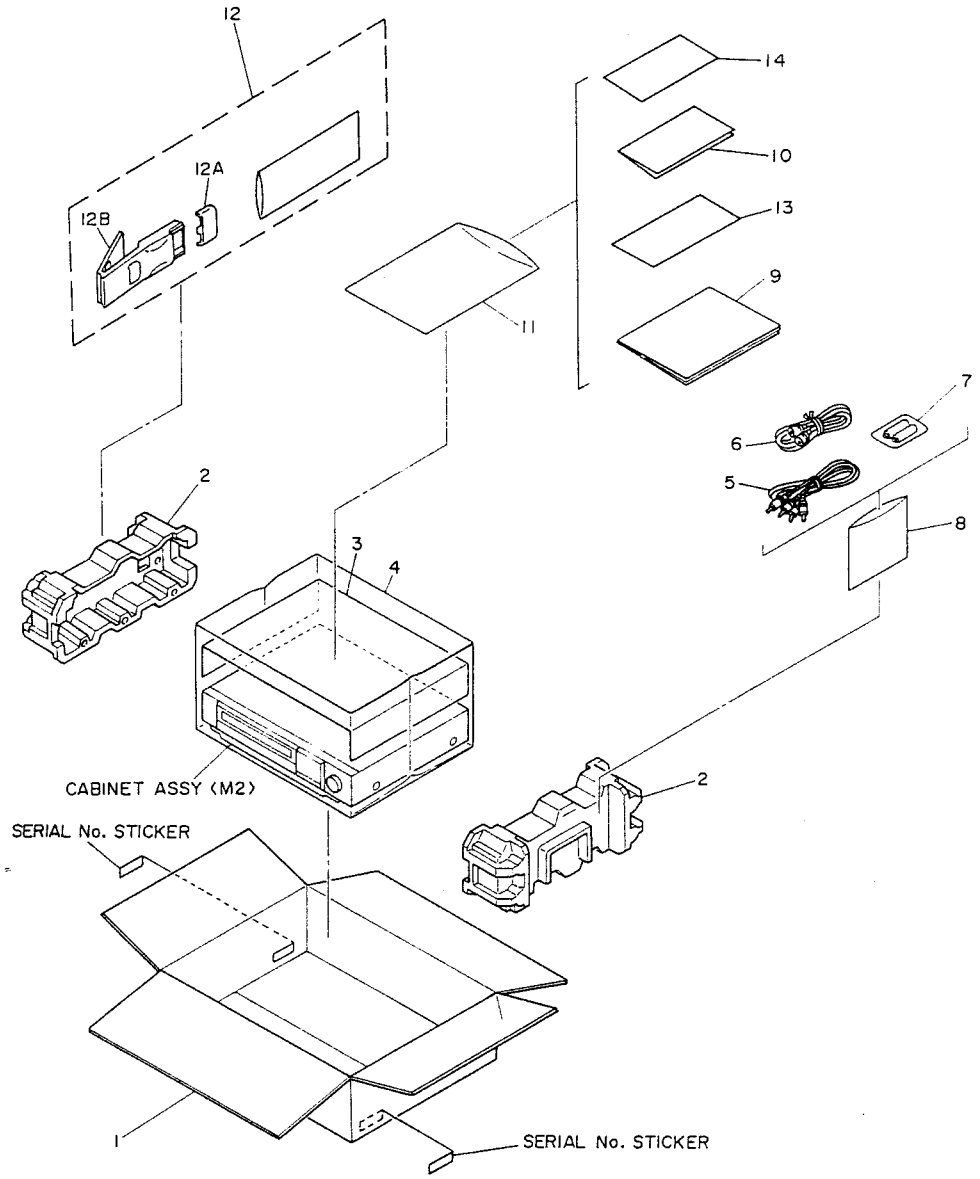
3.39 RF CONVERTER AND MIX BOOSTER SCHEMATIC DIAGRAM

NOTES:
1. All parts slown in this schematic are critical for safety.
2. This schematic is only for reference.
   Avoid replacing individual parts.
   Replace the entire unit only.



SECTION 4
EXPLODED VIEWS AND PARTS LIST

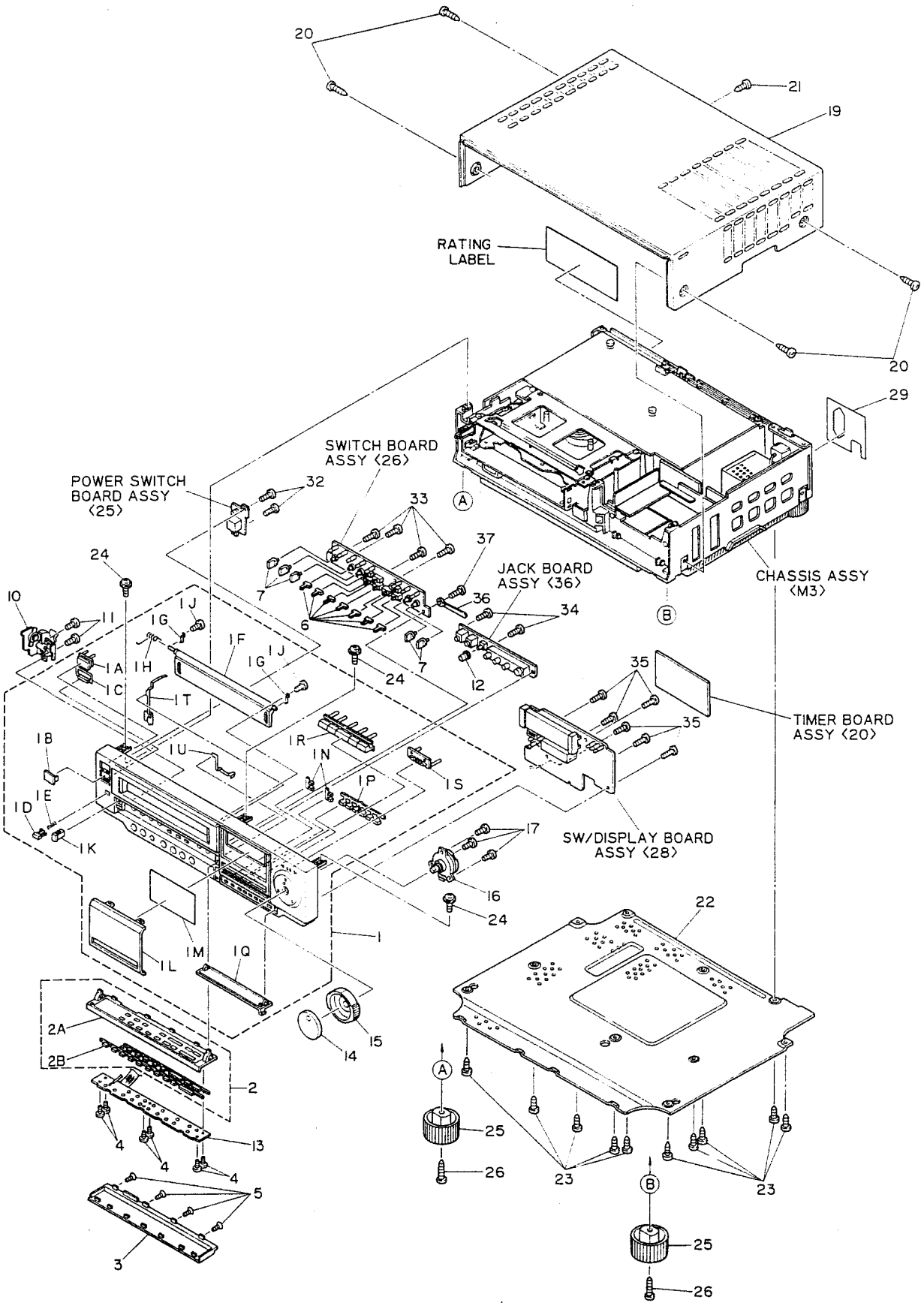
4.1 PACKING ASSEMBLY <M1>



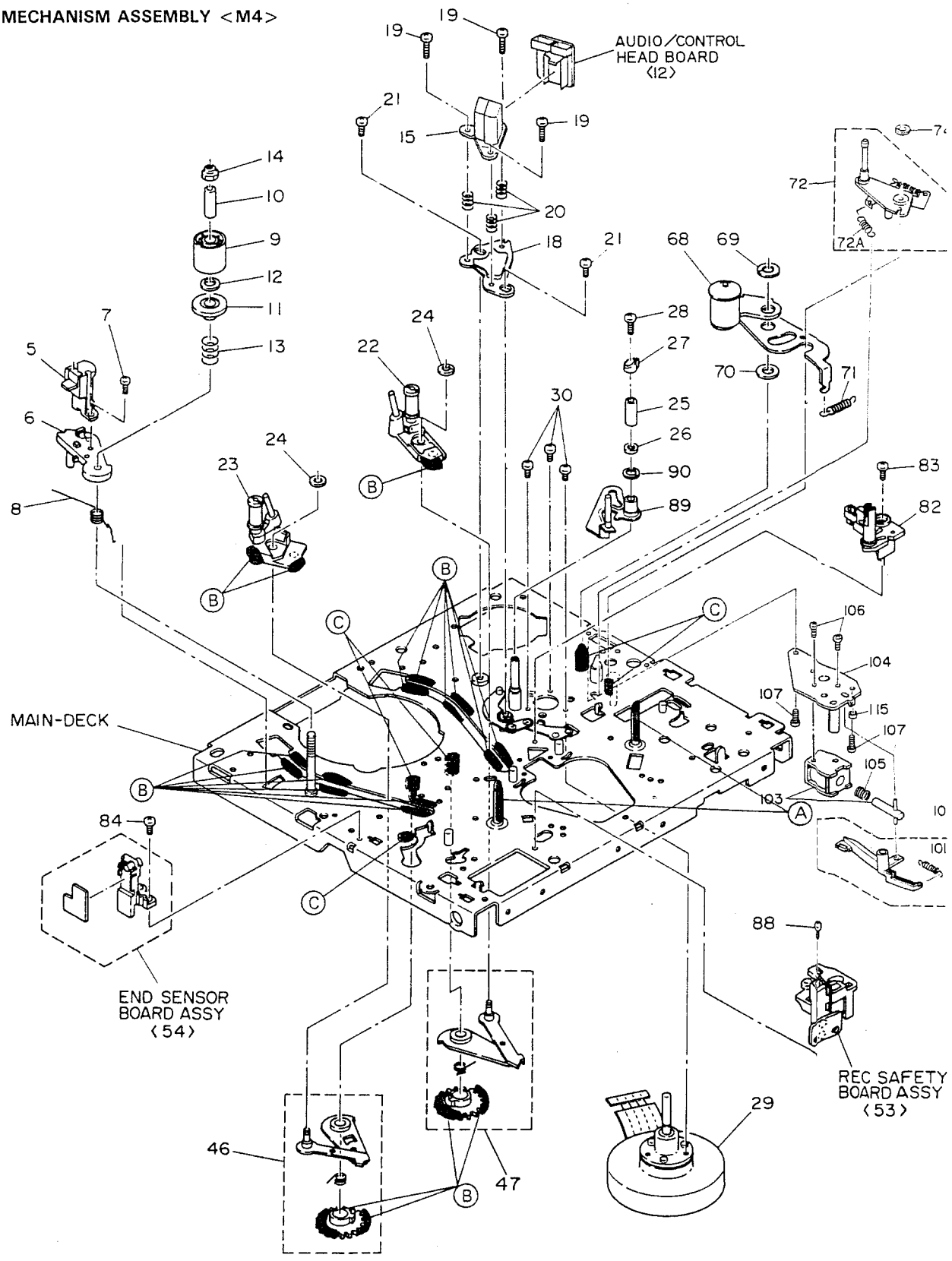
PACKING ASSEMBLY <M1>

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION
	1	PQ33074	PACKING CASE, EG
		PQ33074-2	PACKING CASE, E
	2	PQ33073A	CUSHION ASSY
	3	PU57777	WADDING PAPER
	4	PQM30021-70	POLY BAG
	5	PU56142-3	PIN CORD ASSY
		or PU56142-5	PIN CORD ASSY
	6	PU59168-3	RF CABLE
		or PU59167-3	RF CABLE
	7	UM-3DJ2P	BATTERY
	8	QPGA020-02005	POLY BAG
⚠	9	PU30425-1087	INSTRUCTIONS, E
⚠		PU30425-1085	INSTRUCTIONS, EG
	10	TCN-3379	TAPE CATALOG
	11	QPGA025-03505	POLY BAG
⚠	12	PQ10779AD	REMOTE CONTROLLER, E
⚠		PQ10779AC-19	REMOTE CONTROLLER, EG
	12A	PQ32715	BATTERY CAP
	12B	PQ32901B	DOOR ASSY, EG
		PQ32901D	DOOR ASSY, E
	13	BT-20114	WARRANTY CARD, EG
⚠	14	—	DBP INF SHEET, EG

4.2 CABINET ASSEMBLY <M2>

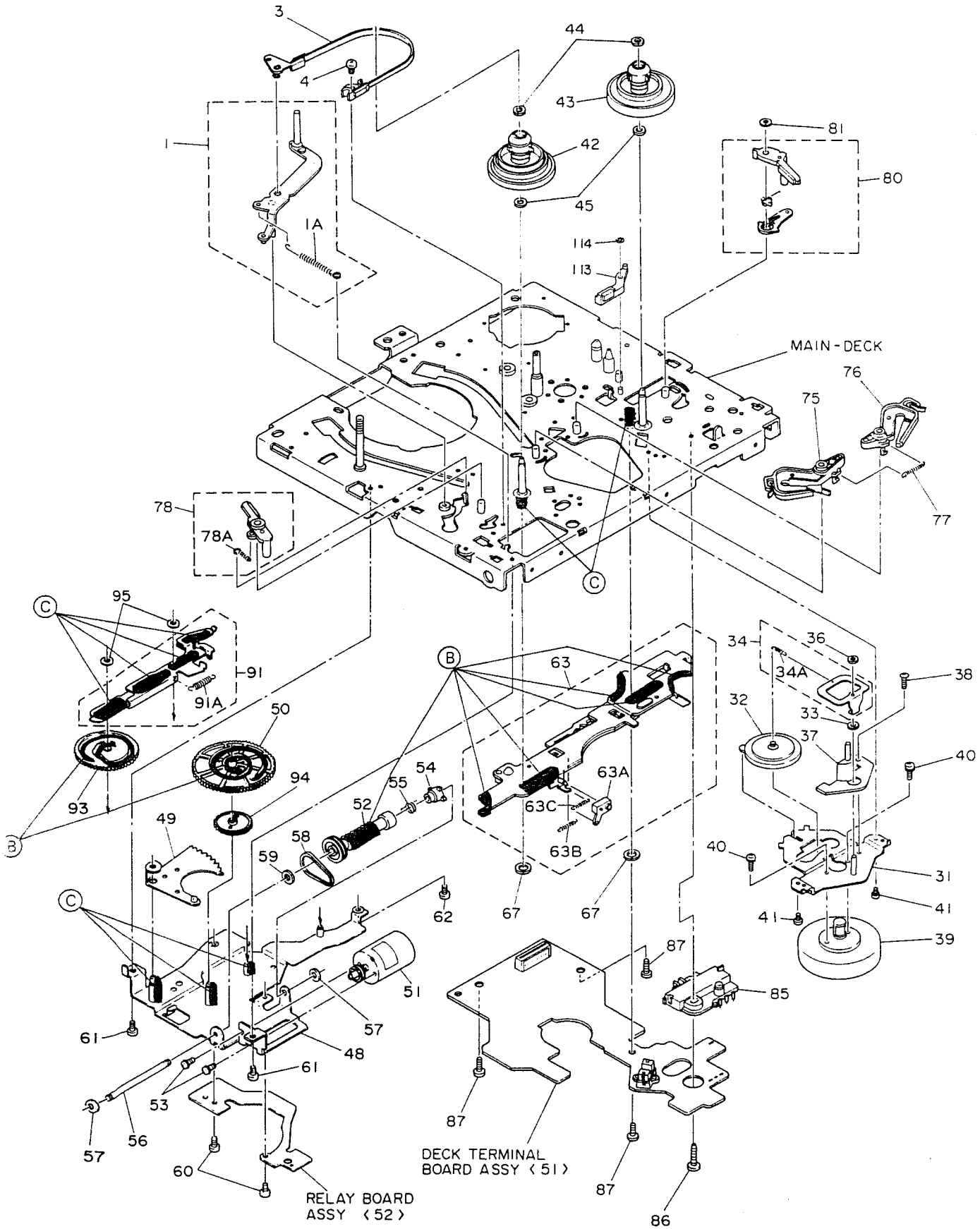


4.4 MECHANISM ASSEMBLY <M4>



Category	Part number	Mark
Oil	COSMO-HV56	Ⓐ
Grease (Black)	MOS2-C	Ⓑ
Grease (Ivory)	DAPHNE-XLA-2	Ⓒ

NOTE: The section marked in red (Ⓐ, Ⓑ and Ⓒ) indicate lubrication and greasing areas.


3
4
44
43
42
45
81
80
1
1A
114
113
MAIN-DECK
76
75
77
78
78A
C
95
91
91A
B
63
34
36
34A
38
32
33
37
40
50
94
93
63A
63C
63B
55
54
52
58
59
49
62
67
67
40
31
41
41
39
87
85
51
57
61
48
61
53
56
57
60
87
87
86
DECK TERMINAL
BOARD ASSY (51)
RELAY BOARD
ASSY (52)

MECHANISM ASSEMBLY <M4>

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION
	1	PQ43710A	TENSION ARM ASS'Y
	1A	PQ41952-5	SPRING
	3	PQ41948A	TENSION BAND ASSY
	4	SDST2606Z	SCREW
	5	PU57641-2	FULL ERASE HEAD
	6	PQ31036	FULL ERASE HEAD BASE
	7	SPSG2606Z	SCREW
	8	PQ41954-1-1	TORSION SPRING
	9	PQ41955	IMPEDANCE ROLLER
	10	PQ41956	COLLAR
	11	PQ41957	LOWER FLANGE
	or	PQ42958	LOWER FLANGE
	12	PQM30018-39	SPACER
	or	PQM30018-50	SPACER
	13	PQM30002-124	COMPRESSION SPRING
	14	PQ40353	NYLON NUT
	15	PU60560	AUDIO/CONTROL HEAD
	18	PQ42984-2	HEAD BASE
	19	PQ43687A	SPECIAL SCREW, X3
	20	PU30080-49	SPRING, X3
	21	SDSP2606Z	SCREW, X2
	22	PU60557-1-4	P BASE ASS'Y(TU)
	23	PU60556-1-2	POLE BASE ASSY(SUPPLY)
	24	PQM30017-5	SLIT WASHER, X2
	25	PU53629-3	TAPE GUIDE
	26	PQ40268-2	GUIDE FLANGE
	27	PQ42999-2-1	G.POLE CAP
	28	SDSP2006Z	SCREW
⚠	29	PU60201V	CAPSTAN MOTOR
	30	SPSP2605N	SCREW, X3
	31	PQ41974A-3	REEL MOTOR BRACKET ASSY
	32	PU58645-1-4	IDLER ARM
	33	Q03093-834	WASHER
	34	PQ41976A-1	SP ARM ASSY
	34A	PQ42212-1-4	SPRING
	36	PQM30017-22	SLIT WASHER
	37	PQ41978	HOLDER
	38	SPST2606Z	SCREW
⚠	39	PU59926V	REEL MOTOR
	40	LPSP2604Z	SCREW, X2
	41	SPST2606Z	SCREW, X2
	42	PU59250-1-2	REEL DISK (SUPPLY)
	43	PU58638-1-2	REEL DISK (TAKE-UP)
	44	PQM30017-5	SLIT WASHER, X2
	45	Q03093-828	WASHER, X2
	46	PQ41979A-5	LOADING ARM ASSY (SUPLLY)
	47	PQ41985B-3	LOADING ARM AY (TAKE-UP)
	48	PQ42973A	CAM BKT ASS'Y
	49	PQ41994A-3	ARM GEAR ASSY
	50	PQ20428	CONTROL CAM
	51	PQ41996B	MODE MOTOR ASSY
	or	PQ41996C	MODE MOTOR ASSY

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION
	52	PQ41998A	WORM ASSY
	53	LPSP2604Z	SCREW, X2
	54	PQ42001	WINDMILL
	55	PQ42002	CLUTCH SPRING
	56	PQ42003	WORM SHAFT
	57	PQM30017-5	SLIT WASHER, X2
	58	PQM30003-20	BELT
	59	PQM30018-22	SPACER
	60	SPST2606Z	SCREW, X2
	61	SPST2606Z	SCREW, X2
	62	LPSP2604Z	SCREW
	63	PQ42038E	PLATE ASSY
	63A	PQ31044-1-2	LOCK LEVER
	63B	PQM30001-223	TENSION SPRING
	63C	PQM30001-211	TENSION SPRING
	67	PQM30017-28	SLIT WASHER, X2
	68	PQ42006B	PINCH ROLLER ARM ASSY
	69	PQM30017-28	SLIT WASHER
	70	Q03093-833	WASHER
	71	PQM30001-229	TENSION SPRING
	72	PQ32676A	GUIDE ARM ASS'Y
	72A	PQ42029	SPRING
	74	PQM30017-6	SLIT WASHER
	75	PQ42019B-6	MAIN BRAKE ASSY (SUPPLY)
	76	PQ42020B	MAIN BRAKE AY (TAKE-UP)
	77	PQM30001-216	TENSION SPRING
	78	PQ42021A-3	SUB BRAKE ASSY (SUPPLY)
	78A	PQ42023-1-2	TENSION SPRING
	80	PQ42037A-2	SUB BRAKE ASSY (TAKE-UP)
	81	PQM30017-6	SLIT WASHER
	82	PU59925-1-1	LED HOLDER
	83	SPST2606Z	SCREW
	84	SPST2606Z	SCREW
	85	PU59924	SLIDE ENCORDER
	86	SDSP2610Z	SCREW
	87	SDSP2606Z	SCREW, X3
	88	SDST2606Z	SCREW
	89	PQ42979A-2	H.L ARM ASS'Y
	90	PQM30017-29	SLIT WASHER
	91	PQ42974A	SLIDE CAM PLATE ASSY
	91A	PQM30001-224	SPRING
	93	PQ31677	H.LOADING CAM
	94	PQ42963	SECOND GEAR
	95	PQM30017-24	SLIT WASHER, X2
	101	PQ43466A	BRAKE ASS'Y
	101A	PQM30001-212	TENSION SPRING
⚠	103	PU60537-2	SOLENOID
	104	PQ43792A	SOLE.BASE ASS'Y
	105	PQM30002-196	COMP.SPRING
	106	SPSP2603Z	SCREW, X2
	107	SPST2606Z	SCREW, X2
	113	PQ43778A	REV.BRAKE ASS'Y
	114	PQM30017-22	SLIT WASHER
	115	PQ40747	STOPPER

SECTION 5
ELECTRICAL PARTS LIST

SAFETY PRECAUTION

Parts identified by the ⚠ symbol are critical for safety. Replace only with specified part numbers.

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION
			**********
			SWITCHING/REGULATOR BOARD ASSEMBLY <01><02>
	PWBA	PB10166G	SWITCHING/REGULATOR BOARD ASSY
⚠	POC1	QMP3980-200	POWER CORD
⚠	AO1	QMC9021-001	AC OUTLET
⚠	BKT1	PQ20531-1-2	TRANS BRACKET
⚠	HD1	QHS3771-108	STRAIN RELIEF
⚠	HS1	PQ43230	HEAT SINK(2)
	SCW1	DPSP3008Z	ASSY SCREW, X2
	SCW2	DPSP3012Z	SCREW, X2
	SCW3	SDST3006Z	SCREW, X3
	SCW4	SBSB3008Z	SCREW, X3
	SCW5	SBSB3006Z	SCREW
	SLD1	PQ32071	SHILD CASE(2)
⚠	SPC1	PQ43773	SHEET(AC)
⚠	F1	QMF51E2-1R25	FUSE
⚠	F2	QMF51E2-2R0	FUSE
			—SWITCHING BOARD ASSEMBLY <01>—
	PWBA1	PB10166G1	SWITCHING BOARD ASSEMBLY
	IC1	STR-D1706	IC
	D1	10E6-F2	DIODE
	D2	10E6-F2	DIODE
	D3	10E6-F2	DIODE
	D4	10E6-F2	DIODE
	D5	RU1A	FR DIODE
	D6	RU1A	FR DIODE
	D7	AU01Z	FR DIODE
	or	ERA48-02-T	FR DIODE
	D8	AU01Z	FR DIODE
	or	ERA48-02-T	FR DIODE
⚠	D9	AU01Z	FR DIODE
⚠	D10	AU01Z	FR DIODE
	D11	F6P20F	FR DIODE
	or	FML-12S	FR DIODE
	D12	F5KQ40B	BARRIER DIODE
	or	FMB-24	BARRIER DIODE
	D13	AU01Z	FR DIODE
	or	ERA48-02-T	FR DIODE

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
	D14	AU01Z	FR DIODE	
	or	ERA48-02-T	FR DIODE	
	D15	RD16ES-T1B2	ZENER DIODE	
	D28	AU01Z	FR DIODE	
	R1	QRZ0078-2R2	W.W.RESISTOR	2.2Ω,2W
	R2	QRD181J-334	RESISTOR	330kΩ,1/8W
	R3	QRD181J-334	RESISTOR	330kΩ,1/8W
	R4	QRG029J-104	OMF RESISTOR	100kΩ,2W
	R5	QRD161J-104	RESISTOR	100kΩ,1/6W
	R6	QRG029J-201	OMF RESISTOR	200Ω,2W
	R7	QRZ0078-R39	WW RESISTOR	0.39Ω,2W
	R9	QVZ3507-101	V RESISTOR, SEMIREG 15V	
	R11	QRD161J-333	RESISTOR	33kΩ,1/6W
⚠	C1	QFZ9022-683	MM CAPACITOR	0.068μF,250V
⚠	C7	QCZ9016-222M	CAPACITOR	0.0022μF,400V
⚠	or	QCZ9048-222	CAPACITOR	0.0022μF,400V
⚠	C8	QCZ9016-222M	CAPACITOR	0.0022μF,400V
⚠	or	QCZ9048-222	CAPACITOR	0.0022μF,400V
	C9	QED61HM-226	E CAPACITOR	22μF,50V
	C10	QEZ0111-107	E CAPACITOR	100μF,400V
	or	QEZ0147-107	E CAPACITOR	100μF,400V
	C11	QCY53AK-472	CAPACITOR	0.0047μF,1kV
	C12	QCY43AK-121	CAPACITOR	120pF,1kV
	C13	QFL41HJ-222	M CAPACITOR	0.0022μF,50V
	C14	QFV41HJ-474	TF CAPACITOR	0.47μF,50V
	or	QFV11HJ-474	TF CAPACITOR	0.47μF,50V
	C15	QEZ0108-187Z	E CAPACITOR	180μF,16V
⚠	C17	QCZ9016-102K	CAPACITOR	0.001μF,400V
⚠	or	QCZ9047-102	CAPACITOR	0.001μF,400V
⚠	C18	QCZ9016-102K	CAPACITOR	0.001μF,400V
⚠	or	QCZ9047-102	CAPACITOR	0.001μF,400V
	C31	QEZ0125-228	E CAPACITOR	2200μF,25V
	or	QEZ0138-228	E CAPACITOR	2200μF,25V
	C32	QEZ0106-228	E CAPACITOR	2200μF,10V
	or	QEZ0136-228	E CAPACITOR	2200μF,10V
	C33	QEZ0104-476Z	E CAPACITOR	47μF,63V
	C34	QEZ0107-476Z	E CAPACITOR	47μF,50V
	C35	QETB1EM-108	E CAPACITOR	1000μF,25V
	C36	QETB1EM-108	E CAPACITOR	1000μF,25V
	C37	QETB1AM-108	E CAPACITOR	1000μF,10V
	C38	QETC1JM-226	E CAPACITOR	22μF,63V
	C39	QETC1HM-226	E CAPACITOR	22μF,50V
	C40	QFL41HJ-102	M CAPACITOR	0.001μF,50V
	C41	QFL41HJ-102	M CAPACITOR	0.001μF,50V
	L11	PU56183-330	COIL	33μH
	L12	PU56183-330	COIL	33μH
	L13	PU56183-330	COIL	33μH
	L14	PU48530-101K	COIL	100μH
	L15	PU48530-101K	COIL	100μH
	L16	PU48530-8R2K	COIL	8.2mH
	L17	PU48530-8R2K	COIL	8.2mH

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
⚠	T1	PU60683	SWITCHING TRANSFORMER	
⚠	HS1	PQ43231-1-1	HEAT SINK(3)	
	HS2	PU60798	HEAT SINK	
⚠	LF2	PU60347	LINE FILTER	
	SLD1	PQ32558-1-1	SHIELD CASE(1)	
	CN1	PU58844-9	CAP HOUSING	
	CN2	PU58844-3	CAP HOUSING	

—REGULATOR BOARD ASSEMBLY <02>—

PWBA2	PB10166G2	REGULATOR BOARD ASSEMBLY	
IC2	BA10324	IC	
IC3	MC7805ACT	IC	
Q11	2SD1856	TRANSISTOR	
	or 2SD1796	TRANSISTOR	
Q12	2SC1740S	TRANSISTOR	
Q13	2SD1856	TRANSISTOR	
	or 2SD1796	TRANSISTOR	
Q14	2SD1856	TRANSISTOR	
	or 2SD1796	TRANSISTOR	
Q15	2SD1856	TRANSISTOR	
	or 2SD1796	TRANSISTOR	
Q16	2SB1186(DE)	TRANSISTOR	
Q18	DTA114ES	TRANSISTOR	
Q19	DTB114ES	TRANSISTOR	
D16	RD6.2ES-T1B3	ZENER DIODE	
	or UZ6.2BSC	ZENER DIODE	
D17	RD5.1ES-T1B2	ZENER DIODE	
	or UZ5.1BSB	ZENER DIODE	
D18	1SS133	DIODE	
	or MA165	DIODE	
D19	HZ6B1TE	DIODE	
	or HZ6B1TJ	DIODE	
D20	RD13ES-T1B3	DIODE	
	or UZ13BSC	ZENER DIODE	
D21	HZS33EB1	ZENER DIODE	
	or MTZ33AT-77	ZENER DIODE	
D22	1SS133	DIODE	
	or MA165	DIODE	
D23	1SS133	DIODE	
	or MA165	DIODE	
D24	1SS133	DIODE	
	or MA165	DIODE	
D25	1SS133	DIODE	
	or MA165	DIODE	
D26	1SS133	DIODE	
	or MA165	DIODE	
D27	RD20ES-T1B2	ZENER DIODE	
	or MTZ20BT-77	ZENER DIODE	
R14	QRD161J-222	RESISTOR	2.2kΩ,1/6W
R15	QRD161J-362	RESISTOR	3.6kΩ,1/6W
R16	QRD161J-472	RESISTOR	4.7kΩ,1/6W
R17	QRD161J-102	RESISTOR	1kΩ,1/6W
R18	QRD161J-622	RESISTOR	6.2kΩ,1/6W

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
	R19	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R20	QRD161J-102	RESISTOR	1kΩ,1/6W
	R21	QRD161J-153	RESISTOR	15kΩ,1/6W
	R22	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R23	QRD161J-102	RESISTOR	1kΩ,1/6W
	R24	QRD161J-102	RESISTOR	1kΩ,1/6W
	R25	QRD161J-153	RESISTOR	15kΩ,1/6W
	R26	QVZ3244-222	V RESISTOR, SWD 5V	
	R27	QRD161J-223	RESISTOR	22kΩ,1/6W
	R28	QRD161J-222	RESISTOR	2.2kΩ,1/6W
	R29	QRD161J-103	RESISTOR	10kΩ,1/6W
	R30	QRD161J-392	RESISTOR	3.9kΩ,1/6W
	R31	QRD161J-102	RESISTOR	1kΩ,1/6W
	R32	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R33	QRD161J-331	RESISTOR	330Ω,1/6W
⚠	R35	QRZ0077-220X	FUSIBLE RESISTOR	22Ω,1/4W
⚠	R36	QRZ0077-220X	FUSIBLE RESISTOR	22Ω,1/4W
	R43	QRD161J-392	RESISTOR	3.9kΩ,1/6W
	R44	QRD181J-1R0	RESISTOR	1Ω,1/8W
	R45	QRD181J-1R0	RESISTOR	1Ω,1/8W
	R46	QRD181J-1R0	RESISTOR	1Ω,1/8W
	R47	QRD181J-1R0	RESISTOR	1Ω,1/8W
	R48	QRD181J-1R0	RESISTOR	1Ω,1/8W
	R49	QRD181J-1R0	RESISTOR	1Ω,1/8W
	R50	QRD181J-1R0	RESISTOR	1Ω,1/8W
	R51	QRD181J-1R0	RESISTOR	1Ω,1/8W
	R52	QRD181J-562	RESISTOR	5.6kΩ,1/8W
	R53	QRD181J-562	RESISTOR	5.6kΩ,1/8W
	C43	QFN31HJ-103	M CAPACITOR	0.01μF,50V
	C44	QETC1CM-107	E CAPACITOR	100μF,16V
	C45	QETC1HM-106	E CAPACITOR	10μF,50V
	C46	QFN31HJ-103	M CAPACITOR	0.01μF,50V
	C47	QFN31HJ-103	M CAPACITOR	0.01μF,50V
	C48	QETC1CM-107	E CAPACITOR	100μF,16V
	C49	QFN31HJ-103	M CAPACITOR	0.01μF,50V
	C50	QFN31HJ-102	M CAPACITOR	0.001μF,50V
	C51	QETC1AM-107	E CAPACITOR	100μF,10V
	C52	QETC1HM-476	E CAPACITOR	47μF,50V
	C53	QETC1CM-107	E CAPACITOR	100μF,16V
	C54	QETC1HM-106	E CAPACITOR	10μF,50V
	C55	QFN31HJ-103	M CAPACITOR	0.01μF,50V
	C56	QFN31HJ-103	M CAPACITOR	0.01μF,50V
	C57	QETC1AM-107	E CAPACITOR	100μF,10V
	C58	QETC1HM-226	E CAPACITOR	22μF,50V
	C60	QETC1HM-226	E CAPACITOR	22μF,50V
⚠	RY1	PU59457	RELAY	
⚠	HD1	PU57505	FUSE CLIP	
	HS1	PQ43701-1-1	HEAT SINK	
⚠	LF1	PU59707	LINE FILTER	
⚠	TAB1	A74316	TAB	
	TP1	PU55774	TEST PIN, X3	

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION
	CN4	PU58844-102	CAP HOUSING
	CN5	PU58844-102R	CAP HOUSING
	CN6	PU58844-106	CAP HOUSING
	CN7	PU59555-105	CAP HOUSING
	CN8	PU59555-108	CAP HOUSING
	CN11	PU58844-103	CAP HOUSING
⚠	CP1	ICP-F25	CIRCUIT PROTECTOR
⚠	CP2	ICP-F25	CIRCUIT PROTECTOR
⚠	CP3	ICP-F20	CIRCUIT PROTECTOR
⚠	CP4	ICP-F20	CIRCUIT PROTECTOR

MAIN BOARD ASSEMBLY <03>

PWBA	PB10329A-01	MAIN BOARD ASSEMBLY
CL1	PU59311-2	WIRE CLAMP
CL2	PU59311	WIRE CLAMP, X2
CL3	PU55379	MINI CLAMP
HN1	PU58018-1-2	PWB HINGE
SPC1	PU60010	SPACER

—AUDIO SECTION—

IC1	AN3380NK	IC
IC2	TA7361AP	IC
IC3	PB20167A-01	FMA MODULE BOARD ASSY
IC4	BA15218N	IC
or	XRA15218N	IC
IC5	BA15218N	IC
or	XRA15218N	IC
IC6	BA15218N	IC
or	XRA15218N	IC
Q1	2SC1740S(RS)	TRANSISTOR
or	2SC3199(GB)-TJK	TRANSISTOR
Q2	2SC1740S(Q)	TRANSISTOR
Q3	DTC114ES	TRANSISTOR
Q4	2SC1740S(RS)	TRANSISTOR
or	2SC3199(GB)-TJK	TRANSISTOR
Q5	DTC114ES	TRANSISTOR
Q6	DTC114ES	TRANSISTOR
Q7	DTC114ES	TRANSISTOR
Q8	DTA114ES	TRANSISTOR
Q9	DTA114ES	TRANSISTOR
Q10	2SC1740S(RS)	TRANSISTOR
or	2SC3199(GB)-TJK	TRANSISTOR
Q11	2SD1450S,T	TRANSISTOR
Q12	DTC143TS	TRANSISTOR
Q13	DTC143TS	TRANSISTOR
Q16	2SC1740S(Q)	TRANSISTOR
Q17	DTA114ES	TRANSISTOR
Q22	2SC1740S(RS)	TRANSISTOR
or	2SC3199(GB)-TJK	TRANSISTOR
Q23	2SC1740S(RS)	TRANSISTOR

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION
or	2SC3199(GB)-TJK	TRANSISTOR	
Q101	2SD1468S(RS)	TRANSISTOR	
Q102	2SA854S(QR)	TRANSISTOR	
Q103	2SC1740S(RS)	TRANSISTOR	
or	2SC3199(GB)-TJK	TRANSISTOR	
Q104	2SA933S(RS)	TRANSISTOR	
D1	1SS133	DIODE	
or	MA165	DIODE	
D2	1SS133	DIODE	
or	MA165	DIODE	
D3	1SS133	DIODE	
or	MA165	DIODE	
D7	1SS133	DIODE	
or	MA165	DIODE	
D8	1SS133	DIODE	
or	MA165	DIODE	
D9	HZ2BLL	ZENER DIODE	
D11	1SS133	DIODE	
or	MA165	DIODE	
D12	1SS133	DIODE	
or	MA165	DIODE	
D13	1SS133	DIODE	
or	MA165	DIODE	
D21	1SS133	DIODE	
or	MA165	DIODE	
D101	1SS133	DIODE	
or	MA165	DIODE	
R1	QRD161J-221	RESISTOR	220Ω,1/6W
R2	QRD161J-332	RESISTOR	3.3kΩ,1/6W
R3	QRD161J-102	RESISTOR	1kΩ,1/6W
R4	QRD182J-682	RESISTOR	6.8kΩ,1/8W
R5	QRD161J-271	RESISTOR	270Ω,1/6W
R6	QRD161J-152	RESISTOR	1.5kΩ,1/6W
R7	QRD161J-182	RESISTOR	1.8kΩ,1/6W
R8	QRD161J-110	RESISTOR	11Ω,1/6W
R9	QVZ3523-473AZ	V RESISTOR, BIAS ADJ	
or	QVZ3518-473AZ	V RESISTOR, BIAS ADJ	
R10	QRD161J-333	RESISTOR	33kΩ,1/6W
R11	QRD161J-473	RESISTOR	47kΩ,1/6W
R12	QRD161J-101	RESISTOR	100Ω,1/6W
R13	QRD161J-473	RESISTOR	47kΩ,1/6W
R14	QRD161J-6R8	RESISTOR	6.8Ω,1/6W
R15	QRD161J-103	RESISTOR	10kΩ,1/6W
R18	QRD161J-153	RESISTOR	15kΩ,1/6W
R19	QRD161J-102	RESISTOR	1kΩ,1/6W
R20	QRD161J-223	RESISTOR	22kΩ,1/6W
R21	QRD161J-271	RESISTOR	270Ω,1/6W
R22	QRD161J-151	RESISTOR	150Ω,1/6W
R23	QRD161J-303	RESISTOR	30kΩ,1/6W
R25	QRD161J-103	RESISTOR	10kΩ,1/6W
R26	QRD161J-334	RESISTOR	330kΩ,1/6W
R27	QRD161J-561	RESISTOR	560Ω,1/6W
R29	QRD161J-102	RESISTOR	1kΩ,1/6W
R31	QRD161J-151	RESISTOR	150Ω,1/6W

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
	R32	QRD161J-102	RESISTOR	1kΩ,1/6W
	R33	QRD161J-102	RESISTOR	1kΩ,1/6W
	R34	QRD161J-151	RESISTOR	150Ω,1/6W
	R35	QRD161J-103	RESISTOR	10kΩ,1/6W
	R36	QRD161J-102	RESISTOR	1kΩ,1/6W
	R37	QRD161J-332	RESISTOR	3.3kΩ,1/6W
	R38	QRD161J-301	RESISTOR	300Ω,1/6W
	R40	QVZ3523-223AZ	V RESISTOR, LEVEL	
		or QVZ3518-223AZ	V RESISTOR, LEVEL	
	R42	QRD161J-243	RESISTOR	24kΩ,1/6W
	R43	QRD161J-101	RESISTOR	100Ω,1/6W
	R44	QRD161J-101	RESISTOR	100Ω,1/6W
	R45	QRD161J-392	RESISTOR	3.9kΩ,1/6W
	R46	QRD161J-332	RESISTOR	3.3kΩ,1/6W
	R47	QRD161J-153	RESISTOR	15kΩ,1/6W
	R48	QRD161J-223	RESISTOR	22kΩ,1/6W
	R49	QRD161J-274	RESISTOR	270kΩ,1/6W
	R50	QRD161J-222	RESISTOR	2.2kΩ,1/6W
	R51	QRD161J-222	RESISTOR	2.2kΩ,1/6W
	R52	QRD161J-473	RESISTOR	47kΩ,1/6W
	R53	QRD161J-333	RESISTOR	33kΩ,1/6W
	R54	QRD161J-223	RESISTOR	22kΩ,1/6W
	R55	QRD161J-183	RESISTOR	18kΩ,1/6W
	R56	QRD161J-182	RESISTOR	1.8kΩ,1/6W
	R57	QRD161J-122	RESISTOR	1.2kΩ,1/6W
	R58	QRD161J-333	RESISTOR	33kΩ,1/6W
	R59	QRD161J-333	RESISTOR	33kΩ,1/6W
	R60	QRD161J-333	RESISTOR	33kΩ,1/6W
	R61	QRD161J-272	RESISTOR	2.7kΩ,1/6W
	R62	QRD161J-333	RESISTOR	33kΩ,1/6W
	R63	QRD161J-102	RESISTOR	1kΩ,1/6W
	R64	QRD161J-331	RESISTOR	330Ω,1/6W
	R65	QRD161J-393	RESISTOR	39kΩ,1/6W
	R66	QRD161J-8R2	RESISTOR	8R.kΩ,1/6W
	R67	QRD161J-103	RESISTOR	10kΩ,1/6W
	R68	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R69	QRD161J-390	RESISTOR	39Ω,1/6W
	R70	QRD161J-273	RESISTOR	27kΩ,1/6W
	R72	QRD161J-392	RESISTOR	3.9kΩ,1/6W
	R73	QRD161J-562	RESISTOR	5.6kΩ,1/6W
	R74	QRD161J-562	RESISTOR	5.6kΩ,1/6W
	R75	QRD161J-102	RESISTOR	1kΩ,1/6W
	R78	QRD161J-272	RESISTOR	2.7kΩ,1/6W
	R79	QRD161J-272	RESISTOR	2.7kΩ,1/6W
	R80	QRD161J-562	RESISTOR	5.6kΩ,1/6W
	R81	QRD161J-103	RESISTOR	10kΩ,1/6W
	R82	QRD161J-153	RESISTOR	15kΩ,1/6W
	R83	QRD161J-681	RESISTOR	680Ω,1/6W
	R84	QRD161J-681	RESISTOR	680Ω,1/6W
	R85	QRD161J-222	RESISTOR	2.2kΩ,1/6W
	R86	QRD161J-103	RESISTOR	10kΩ,1/6W
	R87	QRD161J-102	RESISTOR	1kΩ,1/6W
	R88	QRD161J-102	RESISTOR	1kΩ,1/6W
	R101	QRD161J-471	RESISTOR	470Ω,1/6W
	R103	QRD161J-103	RESISTOR	10kΩ,1/6W
	R104	QRD161J-222	RESISTOR	2.2kΩ,1/6W
	R106	QRD161J-512	RESISTOR	5.1kΩ,1/6W

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
	R107	QRD161J-104	RESISTOR	100kΩ,1/6W
	R108	QRD161J-221	RESISTOR	220Ω,1/6W
	R109	QRD161J-273	RESISTOR	27kΩ,1/6W
	R110	QRD161J-154	RESISTOR	150kΩ,1/6W
	R111	QRD161J-222	RESISTOR	2.2kΩ,1/6W
	R112	QRD161J-223	RESISTOR	22kΩ,1/6W
	R113	QRD161J-683	RESISTOR	68kΩ,1/6W
	R114	QRD161J-102	RESISTOR	1kΩ,1/6W
	R115	QRD161J-222	RESISTOR	2.2kΩ,1/6W
	R116	QRD161J-222	RESISTOR	2.2kΩ,1/6W
	R117	QRD161J-222	RESISTOR	2.2kΩ,1/6W
	R118	QRD161J-222	RESISTOR	2.2kΩ,1/6W
	R119	QRD161J-223	RESISTOR	22kΩ,1/6W
	R120	QRD161J-222	RESISTOR	2.2kΩ,1/6W
	R121	QRD161J-561	RESISTOR	560Ω,1/6W
	R122	QRD161J-104	RESISTOR	100kΩ,1/6W
	C1	QEK61CM-106	E CAPACITOR	10μF,16V
	C2	QETC1AM-476	E CAPACITOR	47μF,10V
	C3	QEP61CM-106	NP E CAPACITOR	10μF,16V
	C4	QEK61CM-106	E CAPACITOR	10μF,16V
	C5	QETC1CM-226	E CAPACITOR	22μF,16V
	C6	QETC1AM-336	E CAPACITOR	33μF,10V
	C7	QETC1AM-476	E CAPACITOR	47μF,10V
	C8	QCBB1HJ-102	CAPACITOR	0.001μF,50V
	C9	QCBB1HJ-101	CAPACITOR	100pF,50V
	C10	QETC1AM-336	E CAPACITOR	33μF,10V
	C11	QETC1AM-107	E CAPACITOR	100μF,10V
	C12	QETC1CM-226	E CAPACITOR	22μF,16V
	C13	QEK61CM-106	E CAPACITOR	10μF,16V
	C14	QEP61CM-106	NP E CAPACITOR	10μF,16V
	C15	QETC1AM-476	E CAPACITOR	47μF,10V
	C16	QEK61CM-106	E CAPACITOR	10μF,16V
	C17	QCBB1HJ-331	CAPACITOR	330pF,50V
	C18	QFV71HJ-223	TF CAPACITOR	0.022μF,50V
	C19	QFL31HJ-102	M CAPACITOR	0.001μF,50V
	C20	QFL31HJ-102	M CAPACITOR	0.001μF,50V
	C21	QETC1EM-475	E CAPACITOR	4.7μF,25V
	C22	QETC1HM-334	E CAPACITOR	0.33μF,50V
	C23	QCBB1HJ-331	CAPACITOR	330pF,50V
	C24	QFL31HJ-102	M CAPACITOR	0.001μF,50V
	C25	QETC1HM-225	E CAPACITOR	2.2μF,50V
	C26	QETC1AM-336	E CAPACITOR	33μF,10V
	C27	QETC0JM-476	E CAPACITOR	47μF,6.3V
	C28	QFV71HJ-563	TF CAPACITOR	0.056μF,50V
	C29	QFV71HJ-273	TF CAPACITOR	0.027μF,50V
	C30	QEK61CM-106	E CAPACITOR	10μF,16V
	C32	QFV71HJ-103	TF CAPACITOR	0.01μF,50V
	C33	QETC1HM-334	E CAPACITOR	0.33μF,50V
	C34	QEB51CM-685	E CAPACITOR	6.8μF,16V
	C35	PU60550-105	E CAPACITOR	1μF,50V
	C36	QETC1CM-106	E CAPACITOR	10μF,16V
	C37	QETC1AM-336	E CAPACITOR	33μF,10V
	C38	QETC1CM-476	E CAPACITOR	47μF,16V
	C39	QETC1AM-336	E CAPACITOR	33μF,10V
	C40	QETC1CM-106	E CAPACITOR	10μF,16V
	C41	QETC1CM-476	E CAPACITOR	47μF,16V

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
	C42	QETC1CM-106	E CAPACITOR	10μF,16V
	C43	QETC1CM-106	E CAPACITOR	10μF,16V
	C44	QETC1CM-106	E CAPACITOR	10μF,16V
	C45	QENC1CM-106	NP E CAPACITOR	10μF,16V
	C46	QENC1CM-106	NP E CAPACITOR	10μF,16V
	C47	QETC1HM-225	E CAPACITOR	2.2μF,50V
	C48	QEK61HM-104	E CAPACITOR	0.1μF,50V
	C49	QCF31HP-223	CAPACITOR	0.022μF,50V
	C50	QFV71HJ-104	TF CAPACITOR	0.1μF,50V
	C51	QFV71HJ-104	TF CAPACITOR	0.1μF,50V
	C52	QFV71HJ-104	TF CAPACITOR	0.1μF,50V
	C53	QCF31HP-223	CAPACITOR	0.022μF,50V
	C54	QEK60JM-107	E CAPACITOR	100μF,6.3V
	C55	QCVB1CN-103	CAPACITOR	0.01μF,16V
	C56	QCBB1HJ-102	CAPACITOR	0.001μF,50V
	C57	QCSB1HJ-330	CAPACITOR	33pF,50V
	C58	QCBB1HJ-331	CAPACITOR	330pF,50V
	C59	QCBB1HJ-102	CAPACITOR	0.001μF,50V
	C60	QCVB1CM-103	CAPACITOR	0.01μF,16V
	C61	QCBB1HJ-221	CAPACITOR	220pF,50V
	C62	QCBB1HJ-821	CAPACITOR	820pF,50V
	C63	QFL31HJ-222	M CAPACITOR	0.0022μF,50V
	C64	QCVB1CN-103	CAPACITOR	0.01μF,16V
	C65	QETC1CM-476	E CAPACITOR	47μF,16V
	C66	QCVB1CN-103	CAPACITOR	0.01μF,16V
	C67	QEK61CM-106	E CAPACITOR	10μF,16V
	C68	QENC1CM-106	NP E CAPACITOR	10μF,16V
	C69	QENC1CM-106	NP E CAPACITOR	10μF,16V
	C70	QETC1CM-106	E CAPACITOR	10μF,16V
	C71	QETC1CM-476	E CAPACITOR	47μF,16V
	C72	QCBB1HJ-561	CAPACITOR	560pF,50V
	C73	QCBB1HJ-561	CAPACITOR	560pF,50V
	C74	QFL31HJ-102	M CAPACITOR	0.001μF,50V
	C75	QFL31HJ-102	M CAPACITOR	0.001μF,50V
	C76	QFV71HJ-333	TF CAPACITOR	0.033μF,50V
	C77	QETC1CM-106	E CAPACITOR	10μF,16V
	C78	QFV71HJ-104	TF CAPACITOR	0.1μF,50V
	C79	QFV71HJ-273	TF CAPACITOR	0.027μF,50V
	C101	QETC1CM-337	E CAPACITOR	330μF,16V
	C103	QETC1CM-476	E CAPACITOR	47μF,16V
	C104	QENC1CM-106	NP E CAPACITOR	10μF,16V
	C105	QENC1CM-106	NP E CAPACITOR	10μF,16V
	C106	QEK61HM-105	E CAPACITOR	1μF,50V
	C107	QEK61HM-105	E CAPACITOR	1μF,50V
	C108	QEK61HM-105	E CAPACITOR	1μF,50V
	C109	QEK61EM-475	E CAPACITOR	4.7μF,25V
	C110	QEK61EM-475	E CAPACITOR	4.7μF,25V
	C111	QEK51CM-476	E CAPACITOR	47μF,16V
	C112	QEK51CM-476	E CAPACITOR	47μF,16V
	C113	QCBB1HJ-151	CAPACITOR	150pF,50V
	C114	QETC1CM-476	E CAPACITOR	47μF,16V
	L1	PU48530-331J	COIL	330μH
	L3	PU58308-682J	COIL	6.8mH
	L4	PU54223-221J	COIL	220μH
	L5	PU48530-101J	COIL	100μH
	BPF1	PU60610	BPF(1.4MHZ)	
	BPF2	PU60611	BPF(1.8MHZ)	
⚠	T1	PU60303	OSC TRANSFORMER	
⚠	T2	PU60304	OSC TRANSFORMER	
	SLD1	PU59960	P/R AMP SHIELD1	
	SLD2	PU59961	P/R AMP SHIELD2	
	SLD3	PU59962	P/R AMP SHIELD3	
	SLD4	PQ42581	PRE AMP SHIELD1	
	SLD6	PQ42583	PRE AMP SHIELD3	
	TP31	PU57545	TEST PIN, X6	
	CN1	PU58844-3	CAP HOUSING	
	CN4	PU58844-2	CAP HOUSING	
	CN5	PU58844-4	CAP HOUSING	
	CN6	PU58844-2	CAP HOUSING	
	CN7	PU58844-4	CAP HOUSING	
	CN8	PU58844-4	CAP HOUSING	
	CN9	PU58844-3	CAP HOUSING	
	CN10	PU59555-5	CAP HOUSING	
	CN11	PU58844-3	CAP HOUSING	
	CN12	PU59555-6	CAP HOUSING	
	CN15	PU58844-2	CAP HOUSING	
	CN16	PU58844-4	CAP HOUSING	
	CN17	PU58844-5	CAP HOUSING	
	CN19	PU58844-2	CAP HOUSING	
⚠	CP1	ICP-F10	CIRCUIT PROTECTOR	

—VIDEO SECTION—

	IC201	PB20289A-02	JOG MODULE	
	IC202	PB20290B	JOG MODULE	
	IC203	MC74HC4538N	IC	
	Q201	DTC144ES	TRANSISTOR	
	Q202	DTA124ES	TRANSISTOR	
	Q203	DTA124ES	TRANSISTOR	
	Q204	DTC114WS	TRANSISTOR	
	Q205	DTC144WS	TRANSISTOR	
⚠	Q206	2SC1740S(RS)	TRANSISTOR	
		or 2SC3199-TJK	TRANSISTOR	
	Q207	2SC1740S(RS)	TRANSISTOR	
		or 2SC3199-TJK	TRANSISTOR	
	Q208	2SA933S(RS)	TRANSISTOR	
		or 2SA1267(YG)-TJK	TRANSISTOR	
	Q209	2SC1740S(RS)	TRANSISTOR	
		or 2SC3199-TJK	TRANSISTOR	
	Q210	2SC1740S(RS)	TRANSISTOR	
		or 2SC3199-TJK	TRANSISTOR	
	Q211	2SC1740S(RS)	TRANSISTOR	
		or 2SC3199-TJK	TRANSISTOR	
	Q212	2SC1740S(RS)	TRANSISTOR	
		or 2SC3199-TJK	TRANSISTOR	
	Q213	DTC124ES	TRANSISTOR	
	Q214	DTC124ES	TRANSISTOR	
	Q215	DTC124ES	TRANSISTOR	
	Q216	2SA933S(RS)	TRANSISTOR	
		or 2SA1267(YG)-TJK	TRANSISTOR	
	Q217	2SA854S(QR)	TRANSISTOR	

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION
	Q218	DTA114ES	TRANSISTOR
	Q219	2SA933S(RS)	TRANSISTOR
		or 2SA1267(YG)-TJK	TRANSISTOR
	Q220	2SC1740S(RS)	TRANSISTOR
		or 2SC3199-TJK	TRANSISTOR
	Q221	DTA124ES	TRANSISTOR
	Q222	DTC124ES	TRANSISTOR
	Q223	2SC1740S(RS)	TRANSISTOR
		or 2SC3199-TJK	TRANSISTOR
	Q224	2SC1740S(RS)	TRANSISTOR
		or 2SC3199-TJK	TRANSISTOR
	Q225	2SC1740S(RS)	TRANSISTOR
		or 2SC3199-TJK	TRANSISTOR
	Q226	2SC1740S(RS)	TRANSISTOR
		or 2SC3199-TJK	TRANSISTOR
	Q227	2SC1740S(RS)	TRANSISTOR
		or 2SC3199-TJK	TRANSISTOR
	Q228	2SC1740S(RS)	TRANSISTOR
		or 2SC3199-TJK	TRANSISTOR
	Q229	DTC144ES	TRANSISTOR
	Q230	2SA933S(RS)	TRANSISTOR
		or 2SA1267(YG)-TJK	TRANSISTOR
	Q231	DTA144ES	TRANSISTOR
	Q232	DTC124XS	TRANSISTOR
	Q233	2SC1740S(RS)	TRANSISTOR
		or 2SC3199-TJK	TRANSISTOR
	D201	1SS133	DIODE
		or MA165	DIODE
	D202	1SS133	DIODE
		or MA165	DIODE
	D203	1SS133	DIODE
		or MA165	DIODE
	D204	1SS133	DIODE
		or MA165	DIODE
	D205	1SS133	DIODE
		or MA165	DIODE
	D206	1SS133	DIODE
		or MA165	DIODE
	D207	1SS133	DIODE
		or MA165	DIODE
	D208	1SS133	DIODE
		or MA165	DIODE
	D209	1SS133	DIODE
		or MA165	DIODE
	D210	1SS133	DIODE
		or MA165	DIODE
	D211	1SS133	DIODE
		or MA165	DIODE
	D212	1SS133	DIODE
		or MA165	DIODE
	D213	1SS133	DIODE
		or MA165	DIODE
	D214	1SS133	DIODE
		or MA165	DIODE
	D215	1SS133	DIODE
		or MA165	DIODE
	D216	1SS133	DIODE
		or MA165	DIODE
	D217	1SS133	DIODE

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
		or MA165	DIODE	
	D218	1SS133	DIODE	
		or MA165	DIODE	
	D219	1SS133	DIODE	
		or MA165	DIODE	
	D220	1SS133	DIODE	
		or MA165	DIODE	
	D221	MA29W(A)	DIODE	
	D222	1SS133	DIODE	
		or MA165	DIODE	
	D223	1SS133	DIODE	
		or MA165	DIODE	
	D224	1SS133	DIODE	
		or MA165	DIODE	
	D225	1SS133	DIODE	
		or MA165	DIODE	
	D226	1SS133	DIODE	
		or MA165	DIODE	
	D227	1SS133	DIODE	
		or MA165	DIODE	
	D228	1SS133	DIODE	
		or MA165	DIODE	
	D229	1SS133	DIODE	
		or MA165	DIODE	
	D230	1SS133	DIODE	
		or MA165	DIODE	
	D231	1SS133	DIODE	
		or MA165	DIODE	
	D232	1SS133	DIODE	
		or MA165	DIODE	
	D233	1SS133	DIODE	
		or MA165	DIODE	
	D234	1SS133	DIODE	
		or MA165	DIODE	
	D235	1SS133	DIODE	
		or MA165	DIODE	
	D236	1SS133	DIODE	
		or MA165	DIODE	
	D237	1SS133	DIODE	
		or MA165	DIODE	
	D238	1SS133	DIODE	
		or MA165	DIODE	
	R201	QRD161J-822	RESISTOR	8.2kΩ,1/6W
	R202	QRD161J-222	RESISTOR	2.2kΩ,1/6W
	R203	QRD161J-152	RESISTOR	1.5kΩ,1/6W
	R204	QRD161J-332	RESISTOR	3.3kΩ,1/6W
	R205	QRD161J-223	RESISTOR	22kΩ,1/6W
	R206	QRD161J-822	RESISTOR	8.2kΩ,1/6W
	R207	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R208	QRD161J-562	RESISTOR	5.6kΩ,1/6W
	R209	QRD161J-102	RESISTOR	1kΩ,1/6W
	R210	QRD161J-683	RESISTOR	68kΩ,1/6W
	R211	QRD161J-183	RESISTOR	18kΩ,1/6W
	R212	QRD161J-122	RESISTOR	1.2kΩ,1/6W
	R213	QRD161J-331	RESISTOR	330Ω,1/6W
	R214	QRD161J-183	RESISTOR	18kΩ,1/6W
	R215	QRD161J-333	RESISTOR	33kΩ,1/6W
	R216	QRD161J-101	RESISTOR	100Ω,1/6W
	R217	QRD161J-820	RESISTOR	82Ω,1/6W

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
	R218	QRD161J-222	RESISTOR	2.2kΩ,1/6W
	R219	QRD161J-182	RESISTOR	1.8kΩ,1/6W
	R220	QRD161J-222	RESISTOR	2.2kΩ,1/6W
	R221	QRD161J-222	RESISTOR	2.2kΩ,1/6W
	R222	QRD161J-182	RESISTOR	1.8kΩ,1/6W
	R223	QRD161J-102	RESISTOR	1kΩ,1/6W
	R224	QRD161J-102	RESISTOR	1kΩ,1/6W
	R225	QRD161J-471	RESISTOR	470Ω,1/6W
	R226	QRD161J-561	RESISTOR	560Ω,1/6W
	R227	QRD161J-103	RESISTOR	10kΩ,1/6W
	R228	QRD161J-153	RESISTOR	15kΩ,1/6W
	R229	QRD161J-222	RESISTOR	2.2kΩ,1/6W
	R230	QRD161J-153	RESISTOR	15kΩ,1/6W
	R231	QRD161J-103	RESISTOR	10kΩ,1/6W
	R232	QVZ3518-152AZ	V RESISTOR, SP REC COL	
	or	QVZ3523-152AZ	V RESISTOR, SP REC COL	
	R233	QRD161J-222	RESISTOR	2.2kΩ,1/6W
	R234	QVZ3518-152AZ	V RESISTOR, LP REC COL	
	or	QVZ3523-152AZ	V RESISTOR, LP REC COL	
	R235	QRD161J-333	RESISTOR	33kΩ,1/6W
	R236	QRD161J-183	RESISTOR	18kΩ,1/6W
	R237	QRD161J-152	RESISTOR	1.5kΩ,1/6W
	R238	QRD161J-681	RESISTOR	680Ω,1/6W
	R239	QVZ3518-332AZ	V RESISTOR, SP EQ	
	or	QVZ3523-332AZ	V RESISTOR, SP EQ	
	R240	QRD161J-821	RESISTOR	820Ω,1/6W
	R241	QRD161J-101	RESISTOR	100Ω,1/6W
	R242	QVZ3518-332AZ	V RESISTOR, LP EQ	
	or	QVZ3523-332AZ	V RESISTOR, LP EQ	
	R243	QRD161J-223	RESISTOR	22kΩ,1/6W
	R244	QRD161J-102	RESISTOR	1kΩ,1/6W
	R245	QRD161J-123	RESISTOR	12kΩ,1/6W
	R246	QRD161J-103	RESISTOR	10kΩ,1/6W
	R247	QRD123J-391SX	RESISTOR	390Ω,1/2W
	R248	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R249	QRD161J-682	RESISTOR	6.8kΩ,1/6W
	R251	QRD161J-102	RESISTOR	1kΩ,1/6W
	R252	QRD161J-102	RESISTOR	1kΩ,1/6W
	R253	QRD161J-222	RESISTOR	2.2kΩ,1/6W
	R256	QRD161J-102	RESISTOR	1kΩ,1/6W
	R257	QRD161J-102	RESISTOR	1kΩ,1/6W
	R260	QRD161J-103	RESISTOR	10kΩ,1/6W
	R261	QRD161J-223	RESISTOR	22kΩ,1/6W
	R262	ERS-A39J-102	THERMISTOR	
	R263	QRD161J-102	RESISTOR	1kΩ,1/6W
	R264	QRD161J-152	RESISTOR	1.5kΩ,1/6W
	R265	QRD161J-153	RESISTOR	15kΩ,1/6W
	R266	QRD161J-103	RESISTOR	10kΩ,1/6W
	R267	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R268	QRD161J-393	RESISTOR	39kΩ,1/6W
	R269	QRD161J-682	RESISTOR	6.8kΩ,1/6W
	R270	QRD161J-821	RESISTOR	820Ω,1/6W
	R271	QRD161J-431	RESISTOR	430Ω,1/6W
	R272	QRD161J-391	RESISTOR	390Ω,1/6W
	R273	QRD161J-332	RESISTOR	3.3kΩ,1/6W
	R274	QRD161J-103	RESISTOR	10kΩ,1/6W
	R275	QRD161J-392	RESISTOR	3.9kΩ,1/6W

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
	R276	QRD161J-273	RESISTOR	27kΩ,1/6W
	R277	QRD161J-273	RESISTOR	27kΩ,1/6W
	R278	QRD161J-183	RESISTOR	18kΩ,1/6W
	R279	QRD161J-684	RESISTOR	680kΩ,1/6W
	R280	QRD161J-392	RESISTOR	3.9kΩ,1/6W
	R281	QRD161J-273	RESISTOR	27kΩ,1/6W
	R282	QRD161J-183	RESISTOR	18kΩ,1/6W
	R283	QRD161J-102	RESISTOR	1kΩ,1/6W
	R284	QRD161J-152	RESISTOR	1.5kΩ,1/6W
	R285	QRD161J-182	RESISTOR	1.8kΩ,1/6W
	R286	QRD161J-563	RESISTOR	56kΩ,1/6W
	R287	QVZ3518-153AZ	V RESISTOR, H. ADJ	
	or	QVZ3523-153AZ	V RESISTOR, H. ADJ	
	or	QVZ3523-153	V RESISTOR, H. ADJ	
	or	QVZ3518-153	V RESISTOR, H. ADJ	
	R288	QVZ3518-683AZ	V RESISTOR, V. ADJ	
	or	QVZ3523-683	V RESISTOR, V. ADJ	
	or	QVZ3518-683	V RESISTOR, V. ADJ	
	or	QVZ3523-683AZ	V RESISTOR, V. ADJ	
	R289	QRD161J-154	RESISTOR	150kΩ,1/6W
	R290	QRD161J-183	RESISTOR	18kΩ,1/6W
	R291	QRD161J-103	RESISTOR	10kΩ,1/6W
	R292	QRD161J-183	RESISTOR	18kΩ,1/6W
	R293	QRD161J-273	RESISTOR	27kΩ,1/6W
	R294	QRD161J-473	RESISTOR	47kΩ,1/6W
	R295	QRD161J-123	RESISTOR	12kΩ,1/6W
	R296	QRD161J-103	RESISTOR	10kΩ,1/6W
	C201	QEN61AM-226	NP E CAPACITOR	22μF,10V
	or	QENC1AM-226	NP E CAPACITOR	22μF,10V
	C202	QCVB1CN-103	CAPACITOR	0.01μF,16V
	C203	QCVB1CN-103	CAPACITOR	0.01μF,16V
	C204	QCVB1CN-103	CAPACITOR	0.01μF,16V
	C205	QCVB1CN-103	CAPACITOR	0.01μF,16V
	C206	QCBB1HJ-121	CAPACITOR	120pF,50V
	C207	QCBB1HJ-121	CAPACITOR	120pF,50V
	C208	QCSB1HJ-470	CAPACITOR	47pF,50V
	C209	QCVB1CN-103	CAPACITOR	0.01μF,16V
	C210	QCVB1CN-103	CAPACITOR	0.01μF,16V
	C211	QCVB1CN-103	CAPACITOR	0.01μF,16V
	C212	QETC0JM-476	E CAPACITOR	47μF,6.3V
	C213	QCVB1CN-103	CAPACITOR	0.01μF,16V
	C214	QCVB1CN-103	CAPACITOR	0.01μF,16V
	C215	QETC0JM-476	E CAPACITOR	47μF,6.3V
	C216	QCVB1CN-103	CAPACITOR	0.01μF,16V
	C217	QCVB1CN-103	CAPACITOR	0.01μF,16V
	C218	QCSB1HJ-390	CAPACITOR	39pF,50V
	C219	QETC1CM-476	E CAPACITOR	47μF,16V
	C220	QCVB1CN-103	CAPACITOR	0.01μF,16V
	C221	QETC0JM-477	E CAPACITOR	470μF,6.3V
	C222	QETC0JM-476	E CAPACITOR	47μF,6.3V
	C223	QCVB1CN-103	CAPACITOR	0.01μF,16V
	C224	QCC31CJ-473	CAPACITOR	0.047μF,16V
	C225	QCBB1HJ-681	CAPACITOR	680pF,50V
	C226	QCC31CJ-682	CAPACITOR	0.0068μF,16V
	C227	QETC1HM-474	E CAPACITOR	0.47μF,50V
	C228	QETC1HM-105	E CAPACITOR	1μF,50V
	C229	QETC0JM-476	E CAPACITOR	47μF,6.3V
	C230	QCVB1CN-103	CAPACITOR	0.01μF,16V

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
	C231	QETC1EM-475	E CAPACITOR	4.7μF,25V
	C232	QCBB1HJ-221	CAPACITOR	220pF,50V
	C233	QETC1HM-335	E CAPACITOR	3.3μF,50V
	C234	QETC0JM-476	E CAPACITOR	47μF,6.3V
	C235	QFN31HJ-821	M CAPACITOR	820pF,50V
	C236	QCVB1CN-103	CAPACITOR	0.01μF,16V
	C237	QFN31HJ-154	M CAPACITOR	0.15μF,50V
	C238	QCBB1HJ-221	CAPACITOR	220pF,50V
	C239	QCC31CJ-393	CAPACITOR	0.039μF,16V
	C240	QCBB1HJ-471	CAPACITOR	470pF,50V
	C241	QCBB1HJ-102	CAPACITOR	0.001μF,50V
	L201	PU48530-101K	COIL	100μH
	L202	PU48530-101K	COIL	100μH
	L203	PU48530-101K	COIL	100μH
	L204	PU59152-221J	COIL	220μH
	L205	PU59152-560J	COIL	56μH
	L206	PU59152-120J	COIL	12μH
	L207	PU48530-101K	COIL	100μH
	L208	PU48530-101K	COIL	100μH
	L209	PU59152-180J	COIL	18μH
	L210	PU48530-101K	COIL	100μH
	L211	PU54710-222	COIL	2.2mH
	L212	PU48530-821J	COIL	820μH
	L213	PU48530-101K	COIL	100μH
	L214	PU59152-R22JW	COIL	0.22μH
	EQ201	PU60714	EQUALIZER	
	or	PU54838	EQUALIZER	
	LC201	PU49057	LC BLOCK	
	TP206	PU57545	TEST PIN, X8	
	CN204	PU58844-7	CAP HOUSING	
	CN205	PU59555-7	CAP HOUSING	
	CN208	PU59555-5	CAP HOUSING	
	CN209	PU58844-4	CAP HOUSING	
	CN210	PU58844-2	CAP HOUSING	
	CN212	PU58844-4	CAP HOUSING	
	CN213	PU59555-4	CAP HOUSING	
	CN214	PU58844-5	CAP HOUSING	
	CN215	PU58844-3	CAP HOUSING	

—MECHACON SECTION—

IC601	M50938A-321SP	IC	
or	M50938E-318SP	IC	
IC602	M50253P	IC	
⚠ IC603	TA8405S	IC	
⚠ IC604	M54647L	IC	
IC605	BA6222	IC	
Q601	2SC1740S(RS)	TRANSISTOR	
D601	HZS4.3EB2	ZENER DIODE	
D602	MA165	DIODE	
or	1SS133	DIODE	
D603	MA165	DIODE	
or	1SS133	DIODE	
D604	MA165	DIODE	

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
	or	1SS133	DIODE	
	D605	HZS7.5EB2	ZENER DIODE	
	or	MTZ7.5B	ZENER DIODE	
	D606	MA165	DIODE	
	or	1SS133	DIODE	
	R601	QRD161J-152	RESISTOR	1.5kΩ,1/6W
	R602	QRD161J-471	RESISTOR	470Ω,1/6W
	R603	QRD161J-103	RESISTOR	10kΩ,1/6W
	R604	QRD161J-103	RESISTOR	10kΩ,1/6W
	R605	QRD161J-332	RESISTOR	3.3kΩ,1/6W
	R606	QRD161J-122	RESISTOR	1.2kΩ,1/6W
	R607	QRD161J-823	RESISTOR	82kΩ,1/6W
	R608	QRD161J-102	RESISTOR	1kΩ,1/6W
	R609	QRD161J-102	RESISTOR	1kΩ,1/6W
	R610	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R611	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R612	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R613	QRD161J-103	RESISTOR	10kΩ,1/6W
	R614	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R615	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R616	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R617	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R618	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R619	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R620	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R621	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R622	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R623	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R624	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R625	QRD161J-333	RESISTOR	33kΩ,1/6W
	R626	QRD161J-124	RESISTOR	120kΩ,1/6W
	R627	QRD161J-124	RESISTOR	120kΩ,1/6W
	R628	QRD161J-103	RESISTOR	10kΩ,1/6W
	R629	QRD161J-331	RESISTOR	330Ω,1/6W
	R630	QRD161J-103	RESISTOR	10kΩ,1/6W
	R631	QRD161J-103	RESISTOR	10kΩ,1/6W
	R632	QRD161J-103	RESISTOR	10kΩ,1/6W
	R633	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R634	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R635	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R636	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R637	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R638	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R639	QRD161J-333	RESISTOR	33kΩ,1/6W
	R640	QRD161J-333	RESISTOR	33kΩ,1/6W
	R641	QRD161J-333	RESISTOR	33kΩ,1/6W
	R642	QRD161J-822	RESISTOR	8.2kΩ,1/6W
	R643	QRD161J-103	RESISTOR	10kΩ,1/6W
	R644	QRD161J-331	RESISTOR	330Ω,1/6W
	R645	QRD161J-561	RESISTOR	560Ω,1/6W
	R646	QRD161J-561	RESISTOR	560Ω,1/6W
	R647	QRD161J-105	RESISTOR	1MΩ,1/6W
	RA601	QRB049J-103C	RESISTOR ARRAY	
	RA602	QRB049J-472C	RESISTOR ARRAY	
	RA603	QRB037J-103	RESISTOR ARRAY	
	C601	QCFB1EZ-223	CAPACITOR	0.022μF,25V

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
	C602	QCFB1EZ-223	CAPACITOR	0.022μF,25V
	C603	QEK61HM-335	E CAPACITOR	3.3μF,50V
	C604	QCC11CJ-104	CAPACITOR	0.1μF,16V
	C605	QEK61HM-475	E CAPACITOR	4.7μF,50V
	C606	QETC1HM-105	E CAPACITOR	1μF,50V
	C607	QCFB1EZ-223	CAPACITOR	0.022μF,25V
	C608	QETC1EM-106	E CAPACITOR	10μF,25V
	C609	QETC1CM-106	E CAPACITOR	10μF,16V
	C610	QCXB1CM-222	CAPACITOR	0.0022μF,16V
	C611	QCXB1CM-222	CAPACITOR	0.0022μF,16V
	C612	QCFB1EZ-223	CAPACITOR	0.022μF,25V
	L601	PU59152-2R2J	COIL	2.2μH
⚠	CF601	PU60414	CERAMIC FILTER	
⚠	or	PU60942-Z	CERAMIC FILTER	
	K601	PU60281-5	FERRITE BEADS	
	K602	PU60281-5	FERRITE BEADS	
⚠	HS1	PU60158-1-2	HEAT SINK	
	SCW1	SBSE3006Z	SCREW, X2	
	SCW2	SBSE3008Z	SCREW	
	CN601	PU59934-16	WIRE HOLDER	
	CN602	PU59555-6	CAP HOUSING	
	CN603	PU59555-9	CAP HOUSING	
	CN604	PU59555-7	CAP HOUSING	
	CN605	PU59555-8	CAP HOUSING	
	CN606	PU59555-4	CAP HOUSING	
	CN607	PU59555-9	CAP HOUSING	
	CN608	PU59555-6	CAP HOUSING	
	CN609	PU58844-2	CAP HOUSING	
	CN611	PU58844-2	CAP HOUSING	
	CN612	PU60417-4	CAP HOUSING	
	CN613	PU58844-2	CAP HOUSING	

—RF SWITCH SECTION—

	Q701	2SB810H,J	TRANSISTOR	
	D701	1SS133	DIODE	
	D702	1SS133	DIODE	
	R701	QRD161J-393	RESISTOR	39kΩ,1/6W
	R702	QRD161J-102	RESISTOR	1kΩ,1/6W
	C701	QETC1CM-476	E CAPACITOR	47μF,16V
	L701	PU59153-101K	COIL	100μH
	CN701	PU59555-5	CAP HOUSING	
	CN702	PU58844-4	CAP HOUSING	
	CN703	PU58844-5	CAP HOUSING	

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	

VIDEO UNIT BOARD ASSEMBLY <05>

	PWBA	PB10256A-03	VIDEO UNIT BOARD ASSY	
	IC1	PB20166G-01	Y MODULE BOARD ASSY	
⚠	IC2	MSM6967RS	IC	
	IC201	PB20227A	COL MODULE BOARD ASSY	
	IC251	BA7106LS	IC	
	or	XRA7106LS	IC	
	Q1	DTA144EU	TRANSISTOR	
	Q2	2SC2412K	TRANSISTOR	
	Q3	DTC144EK	TRANSISTOR	
	Q4	2SA1037K	TRANSISTOR	
	Q5	2SC2412K	TRANSISTOR	
	Q201	2SC2412K	TRANSISTOR	
	Q202	2SC2412K	TRANSISTOR	
	Q203	DTC124EK	TRANSISTOR	
	Q204	2SC2412K	TRANSISTOR	
	Q205	2SA1037K	TRANSISTOR	
	Q251	DTC124EK	TRANSISTOR	
	D1	1SS133	DIODE	
	or	MA165	DIODE	
	D2	1SS133	DIODE	
	or	MA165	DIODE	
	D3	1SS133	DIODE	
	or	MA165	DIODE	
	D4	MA165	DIODE	
	or	1SS133	DIODE	
	D5	1SS292	DIODE	
	D6	1SS133	DIODE	
	or	MA165	DIODE	
	D7	1SS133	DIODE	
	or	MA165	DIODE	
	D9	RD9.1ES-T1B2	ZENER DIODE	
	or	UZ9.1BSB	ZENER DIODE	
	D10	1SS133	DIODE	
	or	MA165	DIODE	
	D201	1SS133	DIODE	
	or	MA165	DIODE	
	D202	1SS133	DIODE	
	or	MA165	DIODE	
	D203	1SS133	DIODE	
	or	MA165	DIODE	
	D251	1SS133	DIODE	
	or	MA165	DIODE	
	D252	1SS133	DIODE	
	or	MA165	DIODE	
	D253	1SS133	DIODE	
	or	MA165	DIODE	
	R1	QRSA08J-103YN	RESISTOR	10kΩ,1/10W
	R2	QRSA08J-102YN	RESISTOR	1kΩ,1/10W

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
	R3	QRSA08J-681YN	RESISTOR	680Ω,1/10W
	R5	QRSA08J-562YN	RESISTOR	5.6kΩ,1/10W
	R6	QRSA08J-103YN	RESISTOR	10kΩ,1/10W
	R7	QRSA08J-104YN	RESISTOR	100kΩ,1/10W
	R8	QRSA08J-273YN	RESISTOR	27kΩ,1/10W
	R9	QRSA08J-394YN	RESISTOR	390kΩ,1/10W
	R10	QRSA08J-103YN	RESISTOR	10kΩ,1/10W
	R11	QRSA08J-221YN	RESISTOR	220Ω,1/10W
	R12	QRSA08J-222YN	RESISTOR	2.2kΩ,1/10W
	R13	QRSA08J-221YN	RESISTOR	220Ω,1/10W
	R14	QRSA08J-222YN	RESISTOR	2.2kΩ,1/10W
	R15	QRSA08J-102YN	RESISTOR	1kΩ,1/10W
	R16	QVZ3518-222AZ	V RESISTOR,NC BALANCE	
		or QVZ3523-222AZ	V RESISTOR,NC BALANCE	
	R17	QRSA08J-222YN	RESISTOR	2.2kΩ,1/10W
	R18	QRSA08J-102YN	RESISTOR	1kΩ,1/10W
⚠	R20	QRD161J-181	RESISTOR	180Ω,1/6W
	R201	QRSA08J-183YN	RESISTOR	18kΩ,1/10W
	R202	QRSA08J-332YN	RESISTOR	3.3kΩ,1/10W
	R203	QRD161J-222	RESISTOR	2.2kΩ,1/6W
	R204	QRSA08J-333YN	RESISTOR	33kΩ,1/10W
	R205	QRD161J-223	RESISTOR	22kΩ,1/6W
	R206	QRSA08J-102YN	RESISTOR	1kΩ,1/10W
	R207	QRSA08J-102YN	RESISTOR	1kΩ,1/10W
	R208	QRSA08J-223YN	RESISTOR	22kΩ,1/10W
	R209	QRSA08J-391YN	RESISTOR	390Ω,1/10W
	R210	QRSA08J-333YN	RESISTOR	33kΩ,1/10W
	R211	QRSA08J-333YN	RESISTOR	33kΩ,1/10W
	R212	QRSA08J-152YN	RESISTOR	1.5kΩ,1/10W
	R213	QRSA08J-331YN	RESISTOR	330Ω,1/10W
	R214	QRSA08J-222YN	RESISTOR	2.2kΩ,1/10W
	R215	QRSA08J-332YN	RESISTOR	3.3kΩ,1/10W
	R216	QRSA08J-102YN	RESISTOR	1kΩ,1/10W
	R217	QRSA08J-393YN	RESISTOR	39kΩ,1/10W
	R218	QRSA08J-332YN	RESISTOR	3.3kΩ,1/10W
	R219	QRSA08J-102YN	RESISTOR	1kΩ,1/10W
	R220	QRSA08J-102YN	RESISTOR	1kΩ,1/10W
	R221	QRSA08J-102YN	RESISTOR	1kΩ,1/10W
	R222	QRSA08J-391YN	RESISTOR	390Ω,1/10W
	R223	QRSA08J-821YN	RESISTOR	820Ω,1/10W
	R224	QRSA08J-471YN	RESISTOR	470Ω,1/10W
	R251	QRSA08J-223YN	RESISTOR	22kΩ,1/10W
	R252	QRSA08J-333YN	RESISTOR	33kΩ,1/10W
	R253	QRD161J-273	RESISTOR	27kΩ,1/6W
	R254	QRSA08J-914YN	RESISTOR	910kΩ,1/10W
	R255	QRSA08J-103YN	RESISTOR	10kΩ,1/10W
	R256	QRSA08J-104YN	RESISTOR	100kΩ,1/10W
	C1	QCSA1HJ-220	CAPACITOR	22pF,50V
	C2	QCFA1HZ-103	CAPACITOR	0.01μF,50V
	C3	QCSA1HJ-151	CAPACITOR	150pF,50V
	C4	QETC1AM-226	E CAPACITOR	22μF,10V
	C5	QCYA1HK-102	CAPACITOR	0.001μF,50V
	C6	QCFA1HZ-103	CAPACITOR	0.01μF,50V
	C7	QETC1EM-335	E CAPACITOR	3.3μF,25V
	C8	QEN60JM-336	NP E CAPACITOR	33μF,6.3V
	C9	QETC1CM-106	E CAPACITOR	10μF,16V
	C10	QCYA1HK-102	CAPACITOR	0.001μF,50V

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
	C11	QCYA1HK-102	CAPACITOR	0.001μF,50V
	C12	QEN61HM-224	NP E CAPACITOR	0.22μF,50V
	C13	QCSA1HJ-120	CAPACITOR	12pF,50V
	C14	QETC1EM-335	E CAPACITOR	3.3μF,25V
	C15	QCVC1CN-103	CAPACITOR	0.01μF,16V
	C16	QEN61HM-335	NP E CAPACITOR	3.3μF,50V
	C17	QETC0JM-337	E CAPACITOR	330μF,6.3V
	C18	QCFA1HZ-103	CAPACITOR	0.01μF,50V
	C19	QEN61HM-225	NP E CAPACITOR	2.2μF,50V
	C20	QCSA1HJ-120	CAPACITOR	12pF,50V
	C21	QETC1EM-475	E CAPACITOR	4.7μF,25V
	C22	QETC1EM-475	E CAPACITOR	4.7μF,25V
	C23	QETC0JM-476	E CAPACITOR	47μF,6.3V
	C24	QETC1HM-104	E CAPACITOR	0.1μF,50V
	C25	QCFA1HZ-103	CAPACITOR	0.01μF,50V
	C26	QCFA1HZ-103	CAPACITOR	0.01μF,50V
	C27	QCFA1HZ-103	CAPACITOR	0.01μF,50V
	C28	QCFA1HZ-103	CAPACITOR	0.01μF,50V
	C29	QETC1AM-476	E CAPACITOR	47μF,10V
	C201	QCSA1HJ-470	CAPACITOR	47pF,50V
	C202	QCVB1CN-103	CAPACITOR	0.01μF,16V
	C203	QCSA1HJ-820	CAPACITOR	82pF,50V
	C204	QETC1HM-475	E CAPACITOR	4.7μF,50V
	C205	QCVB1CN-103	CAPACITOR	0.01μF,16V
	C206	QFN31HJ-224	M CAPACITOR	0.22μF,50V
	C207	QFN31HJ-563	M CAPACITOR	0.056μF,50V
	C208	QETC0JM-337	E CAPACITOR	330μF,6.3V
	C209	QCC31CJ-223	CAPACITOR	0.022μF,16V
	C210	QER60JM-107	E CAPACITOR	100μF,6.3V
	C211	QER61CM-106	E CAPACITOR	10μF,16V
	C212	QETC1HM-224	E CAPACITOR	0.22μF,50V
	C213	QCFA1HZ-103	CAPACITOR	0.01μF,50V
	C214	QCVB1CN-103	CAPACITOR	0.01μF,16V
	C215	QETC1HM-474	E CAPACITOR	0.47μF,50V
	C218	QCFA1HZ-103	CAPACITOR	0.01μF,50V
	C219	QCC11CJ-473	CAPACITOR	0.047μF,16V
	C220	QCBB1HJ-121	CAPACITOR	120pF,50V
	C221	QCBB1HJ-102	CAPACITOR	0.001μF,50V
	C251	QETC1CM-106	E CAPACITOR	10μF,16V
	C252	QFN31HJ-471	M CAPACITOR	470pF,50V
	C253	QCSA1HJ-270	CAPACITOR	27pF,50V
	C254	QETC1HM-335	E CAPACITOR	3.3μF,50V
	C255	QCYA1HK-472	CAPACITOR	0.0047μF,50V
	C256	QCYA1HK-471	CAPACITOR	470pF,50V
	C257	QCSA1HJ-5R0	CAPACITOR	5RpF,50V
	C258	QCFA1HZ-103	CAPACITOR	0.01μF,50V
	C259	QCFA1HZ-103	CAPACITOR	0.01μF,50V
	C260	QCFA1HZ-103	CAPACITOR	0.01μF,50V
	C261	QCSA1HJ-200	CAPACITOR	20pF,50V
	C262	QCFA1HZ-103	CAPACITOR	0.01μF,50V
	C263	QETB0JM-477	E CAPACITOR	470μF,6.3V
	C264	QCFA1HZ-103	CAPACITOR	0.01μF,50V
	C265	QCFA1HZ-103	CAPACITOR	0.01μF,50V
	L1	PU59152-121J	COIL	120μH
	L2	PU59152-680J	COIL	68μH
	L3	PU48530-101K	COIL	100μH

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
	L4	PU48530-101K	COIL	100μH
	L5	PU59152-101J	COIL	100μH
	L6	PU48530-101K	COIL	100μH
	L201	PU48530-271J	COIL	270μH
	L202	PU59153-822J	COIL	8.2mH
⚠	L203	PU48530-151J	COIL	150μH
	L205	PU59152-150J	COIL	15μH
	L251	PU59152-330J	COIL	33μH
	L252	PU48530-101K	COIL	100μH
	EQ2	PU60162-2	EQUALIZER	
	or	PU60162	EQUALIZER	
	EQ201	PU53501-11	EQUALIZER	
	or	PU53501-6	EQUALIZER	
	LPF1	PU58021-3	LOW PASS FILTER	
	or	PU60715	LOW PASS FILTER	
	or	PU58021-2	LOW PASS FILTER	
	LPF2	PU60716	LOW PASS FILTER	
	LPF201	PU58022	LOW PASS FILTER	
	BPF201	PU60654	BAND PASS FILTER	
	or	PU60654-2	BAND PASS FILTER	
	BPF202	PU60713	BAND PASS FILTER	
	CF201	PU57073	CERAMIC FILTER	
	DL201	PU60340	COMB FILTER	
	or	PU60222	2H DELAY LINE	
	or	PU60490	COMB FILTER	
	or	PU58971-3	2H DELAY LINE	
	LC251	PU60655	COIL,SECAM DET	
⚠	X201	PU60653	CRYSTAL UNITS	
	SLD1	PQ42994	SHIELD PLATE	
	SLD2	PQ42995	SHIELD CASE	
	SLD3	PQ42996	SHIELD COVER	
	TP21	PU56347	TEST POINT	
	CN1	PU60330-113	CONNECTOR	
	CN2	PU60330-113	CONNECTOR	
	CN3	PU60330-110	TERMINAL	

TERMINAL BOARD ASSEMBLY <06>

	PWBA	PB20382A	TERMINAL BOARD ASSEMBLY, EG
		PB20382B	TERMINAL BOARD ASSEMBLY, E
⚠	RF1	PU60817-1-1	RF CONVERTER/MIX BOOSTER
	IC1	LA7222	IC
	IC2	M5218P	IC

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
	R1	QRD161J-471	RESISTOR	470Ω,1/6W
	R2	QRD161J-471	RESISTOR	470Ω,1/6W
	R3	QRD161J-103	RESISTOR	10kΩ,1/6W
	R4	QRD161J-103	RESISTOR	10kΩ,1/6W
	R5	QRD161J-273	RESISTOR	27kΩ,1/6W
	R6	QRD161J-273	RESISTOR	27kΩ,1/6W
	R7	QRD161J-563	RESISTOR	56kΩ,1/6W
	R8	QRD161J-563	RESISTOR	56kΩ,1/6W
	R9	QRD161J-563	RESISTOR	56kΩ,1/6W
	R10	QRD161J-563	RESISTOR	56kΩ,1/6W
	R11	QRD161J-471	RESISTOR	470Ω,1/6W
	R12	QRD161J-471	RESISTOR	470Ω,1/6W
	R13	QRD161J-223	RESISTOR	22kΩ,1/6W
	R14	QRD161J-750	RESISTOR	75Ω,1/6W
	R15	QRD161J-750	RESISTOR	75Ω,1/6W
	C1	QEK61HM-475	E CAPACITOR	4.7μF,50V
	C2	QEK61HM-475	E CAPACITOR	4.7μF,50V
	C3	QEK61CM-106	E CAPACITOR	10μF,16V
	C4	QEK61CM-106	E CAPACITOR	10μF,16V
	C6	QEP61EM-475	NP E CAPACITOR	4.7μF,25V
	C7	QEP61EM-475	NP E CAPACITOR	4.7μF,25V
	C8	QCBB1HJ-821	CAPACITOR	820pF,50V
	C9	QCBB1HJ-821	CAPACITOR	820pF,50V
	C12	QEK61CM-476	E CAPACITOR	47μF,16V
	L1	PU59152-120J	COIL	12μH
	L2	PU60281-5	FERRITE BEADS	
	L3	PU59152-120J	COIL	12μH
	BKT1	PQ43683	BRACKET(RF)	
	ETH1	PQ43012-1-1	EARTH PLATE	
	SCW1	SDSF2608Z	SCREW	
	SCW2	SDST2605Z	SCREW	
	TB1	PQ20677-10	TERMINAL BOARD ASSEMBLY, EG	
		PQ20677-14	TERMINAL BOARD ASSEMBLY, E	
	WR1	PW30401-AB22T	COAXIAL CORD	
	CN1	PU59513-4	CAP HOUSING	
	CN2	PU59513-3	CAP HOUSING	
	CN3	PU59513-2	CAP HOUSING	
	CN4	PU59513-4	CAP HOUSING	
	CN5	PU59513-4	CAP HOUSING	
	CN6	PU59513-2	CAP HOUSING	
	CN7	PU59513-5	CAP HOUSING, EG	
		PU59513-3	CAP HOUSING, E	

IF BOARD ASSEMBLY <07>

	PWBA	PB10047AN	IF BOARD ASSEMBLY
	IC1	M51365SP	IC
	Q1	2SC3354	TRANSISTOR

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
	Q2	2SC3354	TRANSISTOR	
	Q3	2SC1317(RS)	TRANSISTOR	
	Q4	2SC1740(RS)	TRANSISTOR	
		or 2SC3199(G)-TJK	TRANSISTOR	
		or 2SC3311A(RS)	TRANSISTOR	
		or 2SC536SPA(FG)	TRANSISTOR	
	Q5	2SC1740(RS)	TRANSISTOR	
		or 2SC3199(G)-TJK	TRANSISTOR	
		or 2SC3311A(RS)	TRANSISTOR	
		or 2SC536SPA(FG)	TRANSISTOR	
	Q6	2SA933S(RS)	TRANSISTOR	
		or 2SA1267(G)-TJK	TRANSISTOR	
		or 2SA1309AR,S	TRANSISTOR	
	Q7	2SC1740(RS)	TRANSISTOR	
		or 2SC3199(G)-TJK	TRANSISTOR	
		or 2SC536SPA(FG)	TRANSISTOR	
		or 2SC3311A(RS)	TRANSISTOR	
	Q10	2SC3354	TRANSISTOR	
	Q11	2SC1740(RS)	TRANSISTOR	
		or 2SC3199(G)-TJK	TRANSISTOR	
		or 2SC3311A(RS)	TRANSISTOR	
		or 2SC536SPA(FG)	TRANSISTOR	
	Q12	DTC144ES	TRANSISTOR	
		or UN4213	TRANSISTOR	
		or 2SC3399	TRANSISTOR	
	Q13	DTC144ES	TRANSISTOR	
		or UN4213	TRANSISTOR	
		or 2SC3399	TRANSISTOR	
	D1	MTZ10B	ZENER DIODE	
	D6	1SS133	DIODE	
	D7	1SS133	DIODE	
	D8	1SS133	DIODE	
	R1	NRD718J-750NBU	RESISTOR	75Ω,1/8W
	R4	NRD718J-332NBU	RESISTOR	3.3kΩ,1/8W
	R5	NRD718J-151NBU	RESISTOR	150Ω,1/8W
	R6	NRD718J-182NBU	RESISTOR	1.8kΩ,1/8W
	R7	NRD718J-331NBU	RESISTOR	330Ω,1/8W
	R8	NRD718J-681NBU	RESISTOR	680Ω,1/8W
	R10	NRD718J-271NBU	RESISTOR	270Ω,1/8W
	R11	NRD718J-820NBU	RESISTOR	82Ω,1/8W
	R15	NRD718J-271NBU	RESISTOR	270Ω,1/8W
	R17	NRD718J-562NBU	RESISTOR	5.6kΩ,1/8W
	R18	NRD718J-332NBU	RESISTOR	3.3kΩ,1/8W
	R19	NRD718J-272NBU	RESISTOR	2.7kΩ,1/8W
	R20	NRD718J-222NBU	RESISTOR	2.2kΩ,1/8W
	R21	QVZ3518-472	V RESISTOR, RF AGC	
		or QVZ3523-472	V RESISTOR, RF AGC	
	R22	NRD718J-824NBU	RESISTOR	820kΩ,1/8W
	R24	NRD718J-821NBU	RESISTOR	820Ω,1/8W
	R31	NRD718J-222NBU	RESISTOR	2.2kΩ,1/8W
	R32	NRD718J-102NBU	RESISTOR	1kΩ,1/8W
	R33	NRD718J-223NBU	RESISTOR	22kΩ,1/8W
	R34	NRD718J-470NBU	RESISTOR	47Ω,1/8W
	R35	NRD718J-561NBU	RESISTOR	560Ω,1/8W
	R36	NRD718J-561NBU	RESISTOR	560Ω,1/8W
	R37	NRD718J-121NBU	RESISTOR	120Ω,1/8W
	R38	NRD718J-182NBU	RESISTOR	1.8kΩ,1/8W

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
	R39	NRD718J-272NBU	RESISTOR	2.7kΩ,1/8W
	R40	QVZ3518-103	V RESISTOR, COL LEVEL	
		or QVZ3523-103	V RESISTOR, COL LEVEL	
	R41	NRD718J-222NBU	RESISTOR	2.2kΩ,1/8W
	R45	NRD718J-471NBU	RESISTOR	470Ω,1/8W
	R46	NRD718J-104NBU	RESISTOR	100kΩ,1/8W
	R47	NRD718J-153NBU	RESISTOR	15kΩ,1/8W
	R48	NRD718J-392NBU	RESISTOR	3.9kΩ,1/8W
	R49	NRD718J-103NBU	RESISTOR	10kΩ,1/8W
	R50	NRD718J-471NBU	RESISTOR	470Ω,1/8W
	R51	NRD718J-223NBU	RESISTOR	22kΩ,1/8W
	R52	NRD718J-223NBU	RESISTOR	22kΩ,1/8W
	R53	NRD718J-103NBU	RESISTOR	10kΩ,1/8W
	R54	NRD718J-682NBU	RESISTOR	6.8kΩ,1/8W
	R57	NRD718J-153NBU	RESISTOR	15kΩ,1/8W
	R62	NRD718J-392NBU	RESISTOR	3.9kΩ,1/8W
	R63	NRD718J-470NBU	RESISTOR	47Ω,1/8W
	R64	NRD718J-182NBU	RESISTOR	1.8kΩ,1/8W
	R65	NRD718J-221NBU	RESISTOR	220Ω,1/8W
	R71	NRD718J-681NBU	RESISTOR	680Ω,1/8W
	R72	NRD718J-470NBU	RESISTOR	47Ω,1/8W
	R73	NRD718J-331NBU	RESISTOR	330Ω,1/8W
	R82	NRD718J-680NBU	RESISTOR	68Ω,1/8W
	R83	NRD718J-331NBU	RESISTOR	330Ω,1/8W
	R84	NRD718J-123NBU	RESISTOR	12kΩ,1/8W
	R85	NRD718J-123NBU	RESISTOR	12kΩ,1/8W
	R86	NRD718J-331NBU	RESISTOR	330Ω,1/8W
	R101	NRD718J-182NBU	RESISTOR	1.8kΩ,1/8W
	R102	NRD718J-222NBU	RESISTOR	2.2kΩ,1/8W
	R104	QRD161J-393	RESISTOR	39kΩ,1/6W
	C2	NCT02CH-3R9NBR	CAPACITOR	3.9pF
	C3	QCT25CH-101	CAPACITOR	100pF
	C4	NCT02CH-4R7NBR	CAPACITOR	4.0μF
	C5	NCB71HK-102NBR	CAPACITOR	0.001μF,50V
	C6	NCX71CM-222NBR	CAPACITOR	0.0022μF,16V
	C7	NCB71HK-102NBR	CAPACITOR	0.001μF,50V
	C8	NCB71HK-102NBR	CAPACITOR	0.001μF,50V
	C10	QETC1CM-336	E CAPACITOR	33μF,16V
	C11	NCY71CM-103NBR	CAPACITOR	0.01μF,16V
	C13	NCX71CM-222NBR	CAPACITOR	0.0022μF,16V
	C14	PU57601-474ME	E CAPACITOR	0.47μF
	C15	QETC1CM-336	E CAPACITOR	33μF,16V
	C16	NCX71CM-222NBR	CAPACITOR	0.0022μF,16V
	C17	NCF71EZ-223NBR	CAPACITOR	0.022μF,25V
	C19	NCY71CM-103NBR	CAPACITOR	0.01μF,16V
	C20	NCY71CM-103NBR	CAPACITOR	0.01μF,16V
	C21	NCB71HK-101NBR	CAPACITOR	100pF,50V
	C24	QETC1HM-105	E CAPACITOR	1μF,50V
	C25	NCX71CM-222NBR	CAPACITOR	0.0022μF,16V
	C26	QFN31HK-222	M CAPACITOR	0.0022μF,50V
	C27	QETC1HM-474	E CAPACITOR	0.47μF,50V
	C29	NCS71HJ-470NBR	CAPACITOR	47pF,50V
	C31	QETC1HM-335	E CAPACITOR	3.3μF,50V

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
	C32	NCF71EZ-223NBR	CAPACITOR	0.022μF,25V
	C33	QETC1HM-474	E CAPACITOR	0.47μF,50V
	C41	NCB71HK-102NBR	CAPACITOR	0.001μF,50V
	C43	NCX71CM-222NBR	CAPACITOR	0.0022μF,16V
	C44	NCB71HK-102NBR	CAPACITOR	0.001μF,50V
	C45	NCB71HK-102NBR	CAPACITOR	0.001μF,50V
	C46	NCB71HK-102NBR	CAPACITOR	0.001μF,50V
	C50	QETC1CM-336	E CAPACITOR	33μF,16V
	C56	QETC1CM-336	E CAPACITOR	33μF,16V
	C57	QEN41CM-336	NP E CAPACITOR	33μF,16V
	or	QEN61CM-336	NP E CAPACITOR	33μF,16V
	C58	NCS71HJ-100NBR	CAPACITOR	10pF,50V
	C60	NCB71HK-102NBR	CAPACITOR	0.001μF,50V
	C63	NCB71HK-102NBR	CAPACITOR	0.001μF,50V
	C64	NCB71HK-391NBR	CAPACITOR	390pF,50V
	L1	PU60025-1R5	COIL	1.5μH
	L2	PU60025-1R0	COIL	1.0μH
	L3	PU60025-1R5	COIL	1.5μH
	L4	PU59152-8R2J	COIL	8.2μH
	L5	PU59152-220J	COIL	22μH
	L6	PU59152-6R8K	COIL	6.8μH
	L7	PU59152-R22K	COIL	0.22μH
	L9	PU59152-6R8K	COIL	6.8μH
	CF1	PU49295-2	N FILTER	
	CF3	PU32990-2	CERAMIC FILTER	
	CF4	PU49295	CERAMIC FILTER	
	CF5	PU32990-4	CERAMIC FILTER	
	SAW1	PU35557-7	SAW FILTER	
	SAW2	PU60765	SAW FILTER	
	T1	PU60042-2	COIL, TRAP	
	T2	PU60497	IF.TRANSFORMER, VCO	
	T4	PU59488	COIL	
	T5	PU60046	IF.TRANSFORMER, SYNC	
	T8	PU60259	COIL	
	JP1	PU59935-16	TERMINAL	

TUNER CONTROL BOARD ASSEMBLY <08>

	PWBA	PB20102T	TUNER CONTROL BOARD ASSY, EG
		PB20102U	TUNER CONTROL BOARD ASSEMBLY,E
⚠	TNR1	PERF0006	TUNER, E
⚠		PERF0004	TUNER, EG
	IC1	M50445-494SP	IC
	IC2	MSM16811RS	IC
	or	CAT93C46P	IC
	Q1	2SC1740S(RS)	TRANSISTOR
	or	2SC3199(G)-TJK	TRANSISTOR

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
	or	2SC536SPA(FG)	TRANSISTOR	
	or	2SC3311A(RS)	TRANSISTOR	
	Q2	2SK381(C)	FE TRANSISTOR	
	Q3	UN4319VI	TRANSISTOR, E	
	Q4	UN4319VI	TRANSISTOR	
	Q5	UN4319VI	TRANSISTOR	
	Q6	UN4319VI	TRANSISTOR	
	Q7	DTA124ES	TRANSISTOR	
	Q8	2SB810H,J	TRANSISTOR	
	Q10	2SD1863(QR)	TRANSISTOR	
	or	2SC3243D,E	TRANSISTOR	
	Q11	2SC3354	TRANSISTOR	
	D1	1SS133	DIODE	
	D2	E-452-2	DIODE	
	D3	HZ30-2	ZENER DIODE	
	D4	RD5.6ES-T1B3	ZENER DIODE	
	or	MTZ5.6CT-77	ZENER DIODE	
	R3	QRD161J-472	RESISTOR, E	4.7kΩ,1/6W
	R4	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R5	QRD161J-104	RESISTOR	100kΩ,1/6W
	R6	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R7	QRD161J-103	RESISTOR	10kΩ,1/6W
	R8	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R11	QRD161J-103	RESISTOR	10kΩ,1/6W
	R12	QRD161J-121	RESISTOR	120Ω,1/6W
	R13	QRD161J-152	RESISTOR	1.5kΩ,1/6W
	R14	QRD161J-562	RESISTOR	5.6kΩ,1/6W
	R15	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R16	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R17	QRD161J-153	RESISTOR	15kΩ,1/6W
	R18	QRD161J-101	RESISTOR	100Ω,1/6W
	R19	QRD161J-103	RESISTOR	10kΩ,1/6W
	R20	QRD161J-104	RESISTOR	100kΩ,1/6W
	R22	QRD161J-104	RESISTOR	100kΩ,1/6W
	R26	QRD161J-104	RESISTOR	100kΩ,1/6W
	R32	QRD161J-222	RESISTOR	2.2kΩ,1/6W
	R33	QRD161J-222	RESISTOR	2.2kΩ,1/6W
	R34	QRD161J-103	RESISTOR	10kΩ,1/6W
	R35	QRD161J-102	RESISTOR	1kΩ,1/6W
	R36	QRD161J-103	RESISTOR	10kΩ,1/6W
	R40	QRD161J-102	RESISTOR	1kΩ,1/6W
	R41	QRD161J-331	RESISTOR	330Ω,1/6W
	R45	QRD161J-103	RESISTOR	10kΩ,1/6W
	R46	QRD161J-103	RESISTOR	10kΩ,1/6W
	R47	QRD161J-103	RESISTOR	10kΩ,1/6W
	R48	QRD161J-103	RESISTOR, E	10kΩ,1/6W
	R51	QRD161J-560	RESISTOR	56Ω,1/6W
	RA1	QRB047J-104	NETWORK RESISTOR	
	C2	QCBB1HK-102	CAPACITOR	0.001μF,50V
	C3	QETC1CM-107	E CAPACITOR	100μF,16V
	C4	QETC1CM-106	E CAPACITOR, E	10μF,16V
	C5	QETC1CM-106	E CAPACITOR	10μF,16V
	C6	QEK61HM-225	E CAPACITOR	2.2μF,50V

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
	C7	QETC1CM-106	E CAPACITOR	10μF,16V
	C8	QCBB1HK-102	CAPACITOR	0.001μF,50V
	C9	QETC1CM-106	E CAPACITOR	10μF,16V
	C13	QFN31HJ-153	M CAPACITOR	0.015μF,50V
	C14	QFV81HJ-474	TF CAPACITOR	0.47μF,50V
		or QFZ9011-474	MM CAPACITOR	0.47μF
	C15	QETC1HM-106	E CAPACITOR	10μF,50V
	C16	QCBB1HK-102	CAPACITOR	0.001μF,50V
	C17	QCVB1CM-103	CAPACITOR	0.01μF,16V
	C18	QCT25CH-220	CAPACITOR	22pF
	C19	QCT25CH-270	CAPACITOR	27pF
	C20	PU57601-335MC	E CAPACITOR	3.3μF
	C23	QETC1CM-106	E CAPACITOR	10μF,16V
	C24	QETC1AM-107	E CAPACITOR	100μF,10V
	C25	QETC1AM-336	E CAPACITOR	33μF,10V
	C31	QCVB1CM-103	CAPACITOR	0.01μF,16V
	C32	QCBB1HJ-910	CAPACITOR	91pF,50V
	L1	PU59152-R22K	COIL	0.22μH
	L2	PU59152-100J	COIL	10μH
	L7	PU59152-1R0K	COIL	1.0μH
	L8	PU59152-1R0K	COIL	1.0μH
	L9	PU59152-2R7J	COIL	2.7μH
	L10	PU59152-5R6J	COIL	5.6μH
		or PU59988-5R6JL	COIL	5.6μH
	L11	PU59152-R22J	COIL	0.22μH
	L12	PU59152-1R0J	COIL	1.0μH
⚠	X1	PU58554-2	CRYSTAL RESONATOR	
	HD1	PU36416-1-3	HOLDER	
	CN2	PU58844-9	CAP HOUSING	
	CN3	PU58844-2	CAP HOUSING	
	CN4	PU59555-5	CAP HOUSING	
	CN5	PU58844-6	CAP HOUSING	
	CN6	PW30401-AE10S	COAXIAL CORD	
	CN7	PW30401-AE10S	COAXIAL CORD	
⚠	CP1	ICP-F10	CIRCUIT PROTECTOR	

AUDIO CONTROL HEAD BOARD ASSEMBLY <12>

	PWB1	PB40029	A/CTL HEAD BOARD
	CN1	PU58844-104	CAP HOUSING
	CN2	PU58844-103B	CAP HOUSING

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	

DEMODULATOR BOARD ASSEMBLY <14>

	PWBA	PB20242C	DEMODULATOR BOARD ASSEMBLY	
	IC1	TDA3800GS	IC	
	Q1	DTC114ES	TRANSISTOR	
		or UN4211	TRANSISTOR	
	or2SC3			
	402	TRANSISTOR		
	Q2	2SD1292(QR)	TRANSISTOR	
		or 2SC3068	TRANSISTOR	
	Q3	DTC114ES	TRANSISTOR	
		or UN4211	TRANSISTOR	
		or 2SC3402	TRANSISTOR	
	Q4	DTC114ES	TRANSISTOR	
		or 2SC3402	TRANSISTOR	
		or UN4211	TRANSISTOR	
	Q5	DTC114ES	TRANSISTOR	
		or UN4211	TRANSISTOR	
		or 2SC3402	TRANSISTOR	
	Q6	DTC114ES	TRANSISTOR	
		or UN4211	TRANSISTOR	
		or 2SC3402	TRANSISTOR	
	Q7	DTC144ES	TRANSISTOR	
		or 2SC3399	TRANSISTOR	
		or UN4213	TRANSISTOR	
	Q8	DTC114ES	TRANSISTOR	
		or UN4211	TRANSISTOR	
		or 2SC3402	TRANSISTOR	
	Q9	2SD1450S,T	TRANSISTOR	
		or 2SD1292(QR)	TRANSISTOR	
	Q10	2SD1450S,T	TRANSISTOR	
		or 2SD1292(QR)	TRANSISTOR	
	Q11	DTA144ES	TRANSISTOR	
	D1	1SS133	DIODE	
	D2	1SS133	DIODE	
	D3	1SS133	DIODE	
	D4	1SS133	DIODE	
	D6	1SS133	DIODE	
	R1	QRD161J-103	RESISTOR	10kΩ,1/6W
	R2	QVZ3518-103	V RESISTOR, SEPARATION ADJ	
	R3	QRD161J-153	RESISTOR	15kΩ,1/6W
	R4	QRD161J-331	RESISTOR	330Ω,1/6W
	R5	QRD161J-821	RESISTOR	820Ω,1/6W
	R6	QRD161J-102	RESISTOR	1kΩ,1/6W
	R7	QRD161J-104	RESISTOR	100kΩ,1/6W
	R8	QRD161J-154	RESISTOR	150kΩ,1/6W
	R9	QRD161J-271	RESISTOR	270Ω,1/6W
	R10	QRD161J-273	RESISTOR	27kΩ,1/6W
	R11	QRD161J-103	RESISTOR	10kΩ,1/6W
	R12	QRD161J-103	RESISTOR	10kΩ,1/6W
	R13	QRD161J-103	RESISTOR	10kΩ,1/6W
	R14	QRD161J-103	RESISTOR	10kΩ,1/6W
	R15	QRD161J-103	RESISTOR	10kΩ,1/6W
	R16	QRD161J-103	RESISTOR	10kΩ,1/6W

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
	R17	QRD161J-103	RESISTOR	10kΩ,1/6W
	R21	QVZ3518-332	V RESISTOR, AUDIO LEVEL(L)	
	R22	QRD161J-222	RESISTOR	2.2kΩ,1/6W
	R23	QRD161J-103	RESISTOR	10kΩ,1/6W
	R24	QVZ3518-332	V RESISTOR, AUDIO LEVEL(R)	
	R25	QRD161J-222	RESISTOR	2.2kΩ,1/6W
	R26	QRD161J-103	RESISTOR	10kΩ,1/6W
	C1	QETC1CM-106	E CAPACITOR	10μF,16V
	C2	QFN31HK-392	M CAPACITOR	0.0039μF,50V
	C3	QFN31HK-392	M CAPACITOR	0.0039μF,50V
	C4	QFN31HK-392	M CAPACITOR	0.0039μF,50V
	C5	QETC1CM-106	E CAPACITOR	10μF,16V
	C6	QETC1CM-106	E CAPACITOR	10μF,16V
	C7	QETC1CM-476	E CAPACITOR	47μF,16V
	C8	QCF31HP-223	CAPACITOR	0.022μF,50V
	C9	QCC11EK-473	CAPACITOR	0.047μF,25V
	C10	QFP31HJ-102	M CAPACITOR	0.001μF,50V
	C11	QETC1CM-477	E CAPACITOR	470μF,16V
	C12	QCC11EK-473	CAPACITOR	0.047μF,25V
	C13	QETC1CM-106	E CAPACITOR	10μF,16V
	C14	QETC1CM-106	E CAPACITOR	10μF,16V
	C15	QETC1CM-336	E CAPACITOR	33μF,16V
	C16	QETC1CM-107	E CAPACITOR	100μF,16V
	C17	QETC1HM-105	E CAPACITOR	1μF,50V
	C18	QETC1CM-476	E CAPACITOR	47μF,16V
	C20	QETC1CM-106	E CAPACITOR	10μF,16V
	BPF1	PU58226	BAND PASS FILTER	
	CF1	PU52775	CERAMIC FILTER	
	CF2	PU52775-2	CERAMIC FILTER	
	T1	PU59489	COIL	
	T2	PU59490	COIL	
	CN1	PU58844-6	CAP HOUSING	
	CN2	PU58844-4	CAP HOUSING	
	CN5	PU58844-5	CAP HOUSING	

TIMER BOARD ASSEMBLY <20>

PWBA		PB20407A-01	TIMER BOARD ASSEMBLY, EG
		PB20407D-01	TIMER BOARD ASSEMBLY, E
IC1		UPD75216ACW-276	IC
	or	UPD75P216ACW276	IC
IC2		S-8053HNB	IC
IC301		SDA5642	IC, EG
Q1		2SD1863(QR)	TRANSISTOR
Q2		2SC3311A(RS)	TRANSISTOR
	or	2SC3199(GB)-TJK	TRANSISTOR
Q3		DTC124ES	TRANSISTOR
Q4		2SC3311A(RS)	TRANSISTOR
	or	2SC3199(GB)-TJK	TRANSISTOR
Q5		DTC124ES	TRANSISTOR
Q6		DTC124ES	TRANSISTOR
D1		RD9.1ES-T1B2	ZENER DIODE
	or	HZS9.1EB2TJ	ZENER DIODE
D2		DA210S	DIODE
D3		MTZJ4.7C	ZENER DIODE
	or	RD4.7ES-T1B3	ZENER DIODE
D4		MTZ8.2B	ZENER DIODE
	or	RD8.2ES-T1B2	ZENER DIODE
D5		MTZ8.2B	ZENER DIODE
	or	RD8.2ES-T1B2	ZENER DIODE
D6		1SS133	DIODE
	or	MA165	DIODE
D7		1SS133	DIODE
	or	MA165	DIODE
D8		1SS133	DIODE
	or	MA165	DIODE
D9		1SS133	DIODE
	or	MA165	DIODE
D10		1SS133	DIODE
	or	MA165	DIODE
D25		1SS133	DIODE
	or	MA165	DIODE
D26		1SS133	DIODE
	or	MA165	DIODE
D29		1SS133	DIODE
	or	MA165	DIODE
D30		1SS133	DIODE
	or	MA165	DIODE
D35		1SS133	DIODE
	or	MA165	DIODE
R1		QRD161J-121	RESISTOR, E 120Ω,1/6W
R2		QRD161J-102	RESISTOR 1kΩ,1/6W
R3		QRD161J-103	RESISTOR 10kΩ,1/6W
R4		QRD161J-682	RESISTOR 6.8kΩ,1/6W
R5		QRD161J-104	RESISTOR 100kΩ,1/6W
R6		QRD161J-151	RESISTOR, E 150Ω,1/6W
R7		QRD161J-102	RESISTOR 1kΩ,1/6W
R8		QRD161J-104	RESISTOR 100kΩ,1/6W
R9		QRD161J-472	RESISTOR 4.7kΩ,1/6W
R13		QRD161J-102	RESISTOR 1kΩ,1/6W
R14		QRD161J-102	RESISTOR 1kΩ,1/6W
R15		QRD161J-102	RESISTOR 1kΩ,1/6W
R16		QRD161J-102	RESISTOR 1kΩ,1/6W
R17		QRD161J-102	RESISTOR 1kΩ,1/6W
R18		QRD161J-102	RESISTOR 1kΩ,1/6W
R19		QRD161J-102	RESISTOR 1kΩ,1/6W
R20		QRD161J-102	RESISTOR 1kΩ,1/6W
R21		QRD161J-102	RESISTOR 1kΩ,1/6W
R22		QRD161J-472	RESISTOR 4.7kΩ,1/6W
R23		QRD161J-472	RESISTOR 4.7kΩ,1/6W
R24		QRD161J-472	RESISTOR 4.7kΩ,1/6W
R25		QRD161J-472	RESISTOR 4.7kΩ,1/6W
R26		QRD161J-102	RESISTOR 1kΩ,1/6W
R29		QRD161J-472	RESISTOR 4.7kΩ,1/6W
R30		QRD161J-472	RESISTOR 4.7kΩ,1/6W
R31		QRD161J-472	RESISTOR 4.7kΩ,1/6W

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
	R32	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R33	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R34	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R35	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R36	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R37	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R38	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R39	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R40	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R41	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R42	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R43	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R44	QRD161J-333	RESISTOR	33kΩ,1/6W
	R45	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R46	QRD161J-102	RESISTOR	1kΩ,1/6W
	R47	QRD161J-333	RESISTOR	33kΩ,1/6W
	R49	QRD161J-272	RESISTOR	2.7kΩ,1/6W
	R50	QRD161J-271	RESISTOR	270Ω,1/6W
	R51	QRD161J-271	RESISTOR	270Ω,1/6W
	R55	QRD161J-104	RESISTOR	100kΩ,1/6W
	R301	QRD161J-824	RESISTOR, EG	820kΩ,1/6W
	R302	QRD161J-101	RESISTOR, EG	100Ω,1/6W
	R303	QRD161J-562	RESISTOR, EG	5.6kΩ,1/6W
	R304	QRD161J-104	RESISTOR, EG	100kΩ,1/6W
	R305	QRD161J-103	RESISTOR	10kΩ,1/6W
	R306	QRD161J-103	RESISTOR	10kΩ,1/6W
	R307	QRD161J-105	RESISTOR, EG	1MΩ,1/6W
	R308	QRD161J-824	RESISTOR, EG	820kΩ,1/6W
	R309	QRD161J-104	RESISTOR, EG	100kΩ,1/6W
	R310	QRD161J-202	RESISTOR, EG	2kΩ,1/6W
	R311	QRD161J-271	RESISTOR, EG	270Ω,1/6W
	R312	QRD161J-271	RESISTOR, EG	270Ω,1/6W
	RA1	QRB067J-224	RESISTOR ARRAY	
		or QRB069J-224	RESISTOR ARRAY	
		or QRB069J-224C	RESISTOR ARRAY	
	RA2	QRB067J-104	NETWORK RESISTOR	
		or QRB069J-104C	RESISTOR ARRAY	
		or QRB069J-104	NETWORK RESISTOR	
	RA3	QRB047J-333	RESISTOR ARRAY	
		or QRB049J-333C	RESISTOR ARRAY	
		or QRB049J-333	RESISTOR ARRAY	
	RA4	QRB037J-104	NETWORK RESISTOR	
		or QRB039J-104	NETWORK RESISTOR	
		or QRB039J-104C	RESISTOR ARRAY	
	C1	QETC1CM-336	E CAPACITOR	33μF,16V
	C2	QETC1HM-335	E CAPACITOR	3.3μF,50V
	C3	QCBB1HJ-102	CAPACITOR	0.001μF,50V
	C4	PU60676-473	E CAPACITOR, EG	0.047μF,5.5V
		QEA40HZ-105	E CAPACITOR (DOUBLE), E	1μF,5V
		or QEA40HZ-473	E CAPACITOR (DOUBLE), EG	0.047μF,5V
	C5	QETC1AM-336	E CAPACITOR	33μF,10V
	C6	QETC0JM-336	E CAPACITOR	33μF,6.3V
	C7	QCVB1CN-103	CAPACITOR	0.01μF,16V
	C8	QETC1CM-106	E CAPACITOR	10μF,16V
	C9	QCVB1CN-103	CAPACITOR	0.01μF,16V
	C10	PU57672-200	TRIMMER CAPACITOR	20pF,100V

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
	C11	QCT30CH-120	CAPACITOR	12pF,50V
	C12	QCC11EJ-473	CAPACITOR	0.047μF,25V
	C301	QFN31HJ-103	M CAPACITOR, EG	0.01μF,50V
	C302	QFN31HJ-333	M CAPACITOR, EG	0.033μF,50V
	C303	QFN31HJ-103	M CAPACITOR, EG	0.01μF,50V
	C304	QETC1HM-106	E CAPACITOR, EG	10μF,50V
	C305	QCBB1HJ-151	CAPACITOR, EG	150pF,50V
	L1	PU48530-101K	COIL	100μH
	X1	PU60226-4	CRYSTAL RESONATOR	
	SPC1	PU59210-002	W.LOKING SPACER, X2	
	TP1	PU56008	TEST-PIN	
	TP2	PU56008	TEST-PIN	
	TP3	PU56008	TEST-PIN	
	CN1	PU59555-9	CAP HOUSING	
	CN2	PU58844-9	CAP HOUSING	
	CN3	PU59555-9	CAP HOUSING	
	CN5	PU58844-3	CAP HOUSING	
	CN6	PU59555-6	CAP HOUSING	
	CN301	PU58844-5	CAP HOUSING, EG	
		PU58844-3	CAP HOUSING, E	
⚠	CP1	ICP-F10	CIRCUIT PROTECTOR	

SWITCH BOARD ASSEMBLY <26>

	PWBA	PB20386A-01	SWITCH BOARD ASSEMBLY
	D301	SLH-34VC3F	LE DIODE, MARK
	D302	SLH-34VC3F	LE DIODE, ERASE
	D303	SLH-34VC3F	LE DIODE, L
	D304	SLH-34VC3F	LE DIODE, R
	D305	SLH-34VC3F	LE DIODE, NORMAL
	D307	SLH-34VC3F	LE DIODE, STEREO
	D308	SLH-34MC3F	LE DIODE, B
	D310	UZ2.0BSB	ZENER DIODE
		or RD2.0ES-T1B2	ZENER DIODE
	R501	PERE0446	V RESISTOR, MIC LEVEL
	R502	PU60939	V RESISTOR, SHARPNESS
	R503	PERE0445	V RESISTOR, V. LOCK
	R505	PU60940	V RESISTOR, REC LEVEL
	R506	PU60889	V RESISTOR, BALANCE
	R601	QRD161J-563	RESISTOR 56kΩ,1/6W
	R602	QRD161J-223	RESISTOR 22kΩ,1/6W
	R603	QRD161J-103	RESISTOR 10kΩ,1/6W
	R604	QRD161J-472	RESISTOR 4.7kΩ,1/6W
	R605	QRD161J-332	RESISTOR 3.3kΩ,1/6W
	R606	QRD161J-222	RESISTOR 2.2kΩ,1/6W
	R607	QRD161J-122	RESISTOR 1.2kΩ,1/6W
	R608	QRD161J-102	RESISTOR 1kΩ,1/6W
	R610	QRD161J-103	RESISTOR 10kΩ,1/6W

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
	R615	QRD161J-333	RESISTOR	33kΩ,1/6W
	R616	QRD161J-333	RESISTOR	33kΩ,1/6W
	R617	QRD161J-823	RESISTOR	82kΩ,1/6W
	R618	QRD161J-331	RESISTOR	330Ω,1/6W
	R619	QRD161J-331	RESISTOR	330Ω,1/6W
	R621	QRD161J-0R0	RESISTOR	0Ω,1/6W
	S401	PU60887	SLIDE SWITCH,TNR SOUND SEL MAIN/SUB	
	S402	PU60887	SLIDE SWITCH, EDIT	
	S403	PU60887	SLIDE SWITCH, AC ON LINE	
	S404	PU60887	SLIDE SWITCH, PREROLL	
	S405	PU60887	SLIDE SWITCH, ALC	
	S406	PU60888	SLIDE SWITCH, LEVEL IND	
	S407	PU60887	SLIDE SWITCH, TNR SOUND SEL	
	HD1	PQM30038-1-2	LED HOLDER	
	CN2	PU58844-2	CAP HOUSING	
	CN3	PU59555-6	CAP HOUSING	
	CN5	PU59555-9	CAP HOUSING	
	CN6	PU59555-4	CAP HOUSING	
	CN7	PU58844-2	CAP HOUSING	
	CN301	PU59973-18	CONNECTOR	
	CN302	PU59555-6	CAP HOUSING	
	CN303	PU59555-5	CAP HOUSING	
	CN304	PU59555-6	CAP HOUSING	

SWITCH/DISPLAY, P. SWITCH, JACK BOARD ASSY <28><25><36>

	PWBA	PB10328A-01	SWITCH DISPLAY BOARD ASSY, EG
		PB10328B-01	SWITCH DISPLAY BOARD ASSY, E
	CL1	PU59311-2	WIRE CLAMP
	CL2	PU55379	WIRE CLAMP

—SWITCH/DISPLAY BOARD ASSEMBLY <28>—

	PWBA1	PB10328B1	SWITCH DISPLAY BOARD ASSY, E
		PB10328A1	SWITCH DISPLAY BOARD ASSY, EG
	IC101	MSC7112-01SS	IC
	IC201	M50255P	IC
	IC204	PU60930	LED LEVEL IND.
	Q101	2SK658	FE TRANSISTOR
	D101	1SS132	DIODE
	D102	1SS132	DIODE
	D103	1SS132	DIODE
	D104	1SS132	DIODE
	D201	SLH-34YC3F	LE DIODE, JOG S/S
	D202	SLH-34MC3F	LE DIODE, JOG REW
	D203	SLH-34MC3F	LE DIODE, JOG FF
	D204	SLH-34YC3F	LE DIODE, STILL PAUSE
	D205	SLH-34VC3F	LE DIODE, A.DUB

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
	D206	SLH-34VC3F	LE DIODE, INSERT	
	D208	SLH-34MC3F	LE DIODE, DIGITAL AV TRACK	
	D209	SLH-34VC3F	LE DIODE, REC	
	D210	SLH-34MC3F	LE DIODE, PLAY	
	R101	QRD161J-102	RESISTOR	1kΩ.1/6W
	R102	QRD161J-102	RESISTOR	1kΩ.1/6W
	R103	QRD161J-102	RESISTOR	1kΩ.1/6W
	R104	QRD161J-273	RESISTOR	27kΩ.1/6W
	R105	QRD161J-102	RESISTOR	1kΩ.1/6W
	R201	QRD161J-102	RESISTOR	1kΩ,1/6W
	R202	QRD161J-122	RESISTOR	1.2kΩ.1/6W
	R203	QRD161J-222	RESISTOR	2.2kΩ,1/6W
	R204	QRD161J-332	RESISTOR	3.3kΩ.1/6W
	R205	QRD161J-472	RESISTOR	4.7kΩ.1/6W
	R206	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R207	QRD161J-472	RESISTOR	4.7kΩ.1/6W
	R208	QRD161J-331	RESISTOR	330Ω,1/6W
	R209	QRD161J-331	RESISTOR	330Ω.1/6W
	R210	QRD161J-331	RESISTOR	330Ω.1/6W
	R211	QRD161J-331	RESISTOR	330Ω.1/6W
	R212	QRD161J-331	RESISTOR	330Ω.1/6W
	R213	QRD161J-472	RESISTOR	4.7kΩ.1/6W
	R214	QRD161J-472	RESISTOR	4.7kΩ.1/6W
	R215	QRD161J-331	RESISTOR	330Ω.1/6W
	R216	QRD161J-331	RESISTOR	330Ω.1/6W
	R217	QRD161J-331	RESISTOR	330Ω.1/6W
	R218	QRD161J-331	RESISTOR	330Ω.1/6W
	R219	QRD161J-331	RESISTOR	330Ω.1/6W
	R220	QRD161J-331	RESISTOR	330Ω,1/6W
	R221	QRD161J-331	RESISTOR	330Ω,1/6W
	R222	QRD161J-331	RESISTOR	330Ω,1/6W
	R223	QRD161J-223	RESISTOR	22kΩ,1/6W
	C101	QCBB1HJ-101	CAPACITOR	100pF,50V
	C102	QER61HM-104	E CAPACITOR	0.1μF,50V
	C103	QER60JM-336	E CAPACITOR	33μF,6.3V
	C104	QCVB1CM-103	CAPACITOR	0.01μF,16V
	C105	QER61VM-106	E CAPACITOR	10μF,35V
	C106	QCSB1HJ-330	CAPACITOR	33pF,50V
	C107	QCSB1HJ-330	CAPACITOR	33pF,50V
	C201	QCFB1EZ-223	CAPACITOR	0.022μF,25V
	C202	QCBB1HJ-331	CAPACITOR	330pF,50V
	C203	QCBB1HJ-121	CAPACITOR	120pF,50V
	C204	QETC0JM-337	E CAPACITOR	330μF,6.3V
	L201	PU49994-101	COIL	100μH
	S108	PU60392-Z	TACT SWITCH, PROG/C ADJ	
	S109	PU60392-Z	TACT SWITCH, START	
	S110	PU60392-Z	TACT SWITCH, SELECT	
	S111	PU60392-Z	TACT SWITCH, REPEAT/STORE	
	S112	PU60392-Z	TACT SWITCH, CANCEL/SKIP	
	S113	PU60392-Z	TACT SWITCH, CH SET/VPS	
	S114	PU60392-Z	TACT SWITCH, SEARCH	
	S117	PU60392-Z	TACT SWITCH, TIMER	
	S201	PU60392-2Z	TACT SWITCH, STOP	

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
	S202	PU60392-2Z	TACT SWITCH, STILL/PAUSE	
	S203	PU60392-2Z	TACT SWITCH, PLAY	
	S204	PU60392-2Z	TACT SWITCH, REW	
	S205	PU60392-2Z	TACT SWITCH, FF	
	S206	PU60392-Z	TACT SWITCH, SET +	
	S207	PU60392-Z	TACT SWITCH, SET-	
	FDP1	PU60500-5	FLUORESCENT DISPLAY PANEL, E	
		PU60500-6	FLUORESCENT DISPLAY PANEL, EG	
	HD1	PQ31355-1-2	FDP HOLDER(R)	
	HD2	PQ31356-1-2	FDP HOLDER(L)	
	CN101	PU59555-6	CAP HOUSING	
	CN102	PU58844-106	CAP HOUSING	
	CN103	PU58844-103	CAP HOUSING	
	CN104	PU59555-9	CAP HOUSING	
	CN105	PU59555-6	CAP HOUSING	
	CN106	PU59555-6	CAP HOUSING	
	CN107	PU59555-9	CAP HOUSING	
	CN108	PU58844-3	CAP HOUSING	
	CN110	PU59555-6	CAP HOUSING	

—POWER SWITCH BOARD ASSEMBLY <25>—

PWBA2	PB10328A2	POWER SWITCH BOARD ASSEMBLY	
IC203	GP1U501	INFRARED RAYS UNIT	
	or SPS-413	INFRARED RAYS UNIT	
	or GP1U501X	INFRARED RAYS UNIT	
D212	SLH-34VC3F	LE DIODE, OPERATE	
R231	QRD161J-0R0	RESISTOR	0Ω,1/6W
R232	QRD161J-0R0	RESISTOR	0Ω,1/6W
R233	QRD161J-223	RESISTOR	22kΩ,1/6W
R234	QRD161J-331	RESISTOR	330Ω,1/6W
S211	PU60392-2Z	TACT SWITCH, POWER	
S212	PU60392-2Z	TACT SWITCH, EJECT	
HD1	PQM30038-3	LED HOLDER	
SPC1	PQM30039	LED SHADE	
CN201	PU59555-5	CAP HOUSING	

—JACK BOARD ASSEMBLY <36>—

PWBA3	PB10328A3	JACK BOARD ASSEMBLY	
R511	PU60740	V RESISTOR, H. PHONE	
R512	QRD161J-103	RESISTOR	10kΩ,1/6W
L501	PU59736-223	N FILTER	
L502	PU59736-223	N FILTER	
J501	PU58356-2	JACK(HEADPHONE)	
J502	PU58355-2	MIC JACK	
CN501	PU59555-5	CAP HOUSING	
CN502	PU58844-3	CAP HOUSING	

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	

PRE/REC BOARD ASSEMBLY <43>

PWBA	PB10322A	PRE/REC BOARD ASSEMBLY	
IC1	AN3386NK-A	IC	
Q1	2SA1267(YG)-TJK	TRANSISTOR	
	or 2SA933S(RS)	TRANSISTOR	
Q2	2SC3199-TJK	TRANSISTOR	
	or 2SC1740S(RS)	TRANSISTOR	
Q3	DTC144WS	TRANSISTOR	
Q4	2SC3199-TJK	TRANSISTOR	
	or 2SC1740S(RS)	TRANSISTOR	
Q5	DTC144WK	TRANSISTOR	
D1	1SS133	DIODE	
	or MA165	DIODE	
D2	1SS133	DIODE	
	or MA165	DIODE	
D3	DAP202K	DIODE	
	or MA151WA	DIODE	
D4	1SS133	DIODE	
	or MA165	DIODE	
R1	QRD161J-102	RESISTOR	1kΩ,1/6W
R2	QRD161J-222	RESISTOR	2.2kΩ,1/6W
R3	QRD161J-222	RESISTOR	2.2kΩ,1/6W
R4	QRD161J-391	RESISTOR	390Ω,1/6W
R5	QRD161J-391	RESISTOR	390Ω,1/6W
R6	QRD161J-821	RESISTOR	820Ω,1/6W
R7	QRD161J-222	RESISTOR	2.2kΩ,1/6W
R8	QRD161J-222	RESISTOR	2.2kΩ,1/6W
R9	QRD161J-821	RESISTOR	820Ω,1/6W
R10	QRD161J-102	RESISTOR	1kΩ,1/6W
R11	QRD161J-122	RESISTOR	1.2kΩ,1/6W
R12	QRD161J-471	RESISTOR	470Ω,1/6W
R13	QRD161J-122	RESISTOR	1.2kΩ,1/6W
R14	QRD161J-104	RESISTOR	100kΩ,1/6W
R15	QRD161J-153	RESISTOR	15kΩ,1/6W
R16	QRD161J-334	RESISTOR	330kΩ,1/6W
R17	QRD161J-103	RESISTOR	10kΩ,1/6W
R18	QRD161J-393	RESISTOR	39kΩ,1/6W
R19	QRD161J-153	RESISTOR	15kΩ,1/6W
R20	QRSA08F-513YN	RESISTOR	51kΩ,1/10W
R21	QRSA08J-914YN	RESISTOR	910kΩ,1/10W
R22	QRD161J-562	RESISTOR	5.6kΩ,1/6W
R23	QRSA08J-331YN	RESISTOR	330Ω,1/10W
R24	QRSA08J-471YN	RESISTOR	470Ω,1/10W
R25	QRSA08J-331YN	RESISTOR	330Ω,1/10W
R26	QRSA08J-331YN	RESISTOR	330Ω,1/10W
R27	QRSA08J-474YN	RESISTOR	470kΩ,1/10W
C1	QETC0JM-476	E CAPACITOR	47μF,6.3V
C2	QCVB1CN-103	CAPACITOR	0.01μF,16V
C3	QCBB1HJ-681	CAPACITOR	680pF,50V
C4	QCSB1HJ-180	CAPACITOR	18pF,50V
C5	QCVB1CN-103	CAPACITOR	0.01μF,16V
C6	QCSB1HJ-200	CAPACITOR	20pF,50V

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
	C7	QCSB1HJ-100	CAPACITOR	10pF,50V
	C8	QCVB1CN-103	CAPACITOR	0.01μF,16V
	C9	QCSB1HJ-180	CAPACITOR	18pF,50V
	C10	QCSB1HJ-680	CAPACITOR	68pF,50V
	C11	QCSB1HK-4R7	CAPACITOR	4.7μF,50V
	C12	QCBB1HJ-471	CAPACITOR	470pF,50V
	C13	QCS81HJ-680	CAPACITOR	68pF,50V
	C14	QCFA1EZ-104	CAPACITOR	0.1μF,25V
	C15	QCVB1CN-103	CAPACITOR	0.01μF,16V
	C17	QCSA1HJ-391	CAPACITOR	390pF,50V
	C18	QER61CM-476	E CAPACITOR	47μF,16V
	C19	QFV41HJ-683	CAPACITOR	0.068μF,50V
	C20	QCFA1HZ-103	CAPACITOR	0.01μF,50V
	C21	QCFA1EZ-104	CAPACITOR	0.1μF,25V
	C22	QCY81EK-104	CAPACITOR	0.1μF,25V
	C23	QCSA1HJ-151	CAPACITOR	150pF,50V
	C24	QCSA1HJ-271	CAPACITOR	270pF,50V
	C25	QCY81EK-104	CAPACITOR	0.1μF,25V
	C26	QCFA1HZ-103	CAPACITOR	0.01μF,50V
	C27	QCFA1HZ-103	CAPACITOR	0.01μF,50V
	C28	QCY81EK-104	CAPACITOR	0.1μF,25V
	C29	QCSA1HJ-101	CAPACITOR	100pF,50V
	C30	QCSA1HJ-101	CAPACITOR	100pF,50V
	C31	QCY81EK-104	CAPACITOR	0.1μF,25V
	C32	QER61AM-685	E CAPACITOR	6.8μF,10V
	C33	QCF81EZ-224	CAPACITOR	0.22μF,25V
	C34	QCFA1HZ-103	CAPACITOR	0.01μF,50V
	C35	QCFA1HZ-103	CAPACITOR	0.01μF,50V
	L1	PU48530-101K	COIL	100μH
	L2	PU59152-560J	COIL	56μH
	L3	PU59152-220J	COIL	22μH
	L4	PU59152-560J	COIL	56μH
	L5	PU59152-470J	COIL	47μH
	L6	PU59152-330J	COIL	33μH
	L7	PU59152-121J	COIL	120μH
	L8	PU48530-101K	COIL	100μH
	BKT1	PQ42955	BRACKET FOR PRE/REC	
	SCW1	DPSP2606Z	SCREW	
	SLD1	PQ43281	SHIELD CASE	
	SLD2	PQ43282	SHIELD PLATE	
	SLD3	PQ43283	SHIELD COVER	
	SPC1	WBS2600Z	T.L.WASHER	
	CN1	PU58844-7	CAP HOUSING	
	CN2	PU59555-7	CAP HOUSING	
	CN3	PU58844-2	CAP HOUSING	
	CN4	PU56258-10	CAP HOUSING	

FLYING ERASE BOARD ASSEMBLY <46>

PWBA	PB30092B	FLYING ERASE BOARD ASSEMBLY	

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
	Q1	2SA933S(Q)	TRANSISTOR	
	or	2SA1267(Y)-TJK	TRANSISTOR	
	Q2	2SC1741S(QR)	TRANSISTOR	
	Q3	2SA933S(Q)	TRANSISTOR	
	or	2SA1267(Y)-TJK	TRANSISTOR	
	Q4	2SD639R	TRANSISTOR	
	Q5	2SD639R	TRANSISTOR	
	D1	UZ8.2BSC	ZENER DIODE	
	D2	1SS133	DIODE	
	R1	QRD161J-473	RESISTOR	47kΩ,1/6W
	R2	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R3	QRD161J-222	RESISTOR	2.2kΩ,1/6W
	R4	QRD161J-473	RESISTOR	47kΩ,1/6W
	R5	QRD161J-183	RESISTOR	18kΩ,1/6W
	R6	QRD161J-104	RESISTOR	100kΩ,1/6W
	R7	QRD161J-121	RESISTOR	120Ω,1/6W
	R8	QRD161J-104	RESISTOR	100kΩ,1/6W
	R9	QRD161J-121	RESISTOR	120Ω,1/6W
	C1	QCVB1CN-103	CAPACITOR	0.01μF,16V
	C2	QCC31EJ-123	CAPACITOR	0.012μF,25V
	C3	QCSB1HJ-560	CAPACITOR	56pF,50V
	C4	QCBB1HJ-820	CAPACITOR	82pF,50V
	C5	QCVB1CN-103	CAPACITOR	0.01μF,16V
	C6	QCBB1HJ-820	CAPACITOR	82pF,50V
	C8	QCT25UJ-181	CAPACITOR	180pF
	C9	QCT05UJ-330	CAPACITOR	33pF
	L1	PU48530-560J	COIL	56μH
	L2	PU48530-3R3K	COIL	3.3μH
	L3	PU48530-3R3K	COIL	3.3μH
	L4	PU59152-101J	COIL	100μH
	T1	PU56175	S.TRANS	
	SLD1	PU60779	SHIELD CASE	
	SLD2	PU60781	SHIELD COVER	
	SLD3	PU60780	SHIELD PLATE	
	CN1	PU58844-3	CAP HOUSING	
	CN2	PU58844-2R	CAP HOUSING	
	CN3	PU58844-2	CAP HOUSING	

SERVO BOARD ASSEMBLY <48>

PWBA	PB10276A-01	SERVO BOARD ASSEMBLY	
IC1	HD49722NT	IC	
IC2	BU3758AS	IC	
IC3	VC2087	IC	
IC4	M50253P	IC	
IC5	SN74HC239N	IC	
IC6	UPC393C	IC	
or	LM393	IC	
IC7	UPD4066BC	IC	
Q1	DTC144ES	TRANSISTOR	
or	UN4213	TRANSISTOR	

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION
		or 2SC3399	TRANSISTOR
	Q3	2SD1809	TRANSISTOR
	Q4	2SC1645S	TRANSISTOR
	Q5	DTC144ES	TRANSISTOR
		or UN4213	TRANSISTOR
		or 2SC3399	TRANSISTOR
	Q6	DTA124ES	TRANSISTOR
		or UN4112	TRANSISTOR
	Q7	DTC144ES	TRANSISTOR
		or UN4213	TRANSISTOR
		or 2SC3399	TRANSISTOR
	D2	1SS133	DIODE
		or MA165	DIODE
	D3	1SS133	DIODE
		or MA165	DIODE
	D4	1SS133	DIODE
		or MA165	DIODE
	D5	1SS133	DIODE
		or MA165	DIODE
	D6	1SS133	DIODE
		or MA165	DIODE
	D7	1SS133	DIODE
		or MA165	DIODE
	D8	1SS133	DIODE
		or MA165	DIODE
	D9	1SS133	DIODE
		or MA165	DIODE
	D10	1SS133	DIODE
		or MA165	DIODE
	D11	1SS133	DIODE
		or MA165	DIODE
	D12	1SS133	DIODE
		or MA165	DIODE
	D13	1SS133	DIODE
		or MA165	DIODE
	D14	1SS133	DIODE
		or MA165	DIODE
	D15	1SS133	DIODE
		or MA165	DIODE
	D16	1SS133	DIODE
		or MA165	DIODE
	D17	1SS133	DIODE
		or MA165	DIODE
	D18	1SS133	DIODE
		or MA165	DIODE
	D19	1SS133	DIODE
		or MA165	DIODE
	D20	1SS133	DIODE
		or MA165	DIODE
	D21	1SS133	DIODE
		or MA165	DIODE
	D22	1SS133	DIODE
		or MA165	DIODE
	D23	1SS133	DIODE
		or MA165	DIODE
	D24	1SS133	DIODE
		or MA165	DIODE
	D25	1SS133	DIODE
		or MA165	DIODE
	D26	1SS133	DIODE

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION
		or MA165	DIODE
	D27	1SS133	DIODE
		or MA165	DIODE
	D28	1SS133	DIODE
		or MA165	DIODE
	D29	1SS133	DIODE
		or MA165	DIODE
	D30	1SS133	DIODE
		or MA165	DIODE
	D31	1SS133	DIODE
		or MA165	DIODE
	D32	1SS133	DIODE
		or MA165	DIODE
	D33	1SS133	DIODE
		or MA165	DIODE
	D34	1SS133	DIODE
		or MA165	DIODE
	D35	1SS133	DIODE
		or MA165	DIODE
	D36	1SS133	DIODE
		or MA165	DIODE
	D37	1SS133	DIODE
		or MA165	DIODE
	D38	1SS133	DIODE
		or MA165	DIODE
	D39	1SS133	DIODE
		or MA165	DIODE
	D40	1SS133	DIODE
		or MA165	DIODE
	D41	1SS133	DIODE
		or MA165	DIODE
	D42	1SS133	DIODE
		or MA165	DIODE
	D43	1SS133	DIODE
		or MA165	DIODE
	D44	1SS133	DIODE
		or MA165	DIODE
	R1	QRD161J-682	RESISTOR 6.8kΩ,1/6W
	R2	QRD161J-102	RESISTOR 1kΩ,1/6W
	R3	QRD161J-155	RESISTOR 1.5MΩ,1/6W
	R4	QRD161J-102	RESISTOR 1kΩ,1/6W
	R5	QRD161J-103	RESISTOR 10kΩ,1/6W
	R6	QRD161J-105	RESISTOR 1MΩ,1/6W
	R7	QRD161J-102	RESISTOR 1kΩ,1/6W
	R8	QRD161J-102	RESISTOR 1kΩ,1/6W
	R9	QRD161J-102	RESISTOR 1kΩ,1/6W
	R10	QRD161J-102	RESISTOR 1kΩ,1/6W
	R11	QRD161J-102	RESISTOR 1kΩ,1/6W
	R16	QRD161J-153	RESISTOR 15kΩ,1/6W
	R17	QRD161J-103	RESISTOR 10kΩ,1/6W
	R18	QRD161J-103	RESISTOR 10kΩ,1/6W
	R19	QRD161J-102	RESISTOR 1kΩ,1/6W
	R20	QRD161J-103	RESISTOR 10kΩ,1/6W
	R21	QRD161J-103	RESISTOR 10kΩ,1/6W
	R22	QRD161J-105	RESISTOR 1MΩ,1/6W
	R23	QRD161J-563	RESISTOR 56kΩ,1/6W
	R24	QRD161J-332	RESISTOR 3.3kΩ,1/6W
	R25	QRD161J-274	RESISTOR 270kΩ,1/6W

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
	R26	QRD161J-273	RESISTOR	27kΩ,1/6W
	R27	QRD161J-333	RESISTOR	33kΩ,1/6W
	R28	QVZ3521-474	V RESISTOR, SP X2 TK PRE-SET	
	or	QVZ3521-474Z	V RESISTOR, SP X2 TK PRE-SET	
	R29	QRD161J-103	RESISTOR	10kΩ,1/6W
	R30	QRD161J-124	RESISTOR	120kΩ,1/6W
	R31	QRD161J-104	RESISTOR	100kΩ,1/6W
	R32	QRD161J-103	RESISTOR	10kΩ,1/6W
	R33	QRD161J-153	RESISTOR	15kΩ,1/6W
	R34	QVZ3521-684	V RESISTOR, SP SW POINT ADJ	
	or	QVZ3521-684Z	V RESISTOR, SP SW POINT ADJ	
	R35	QRD161J-104	RESISTOR	100kΩ,1/6W
	R36	QRD161J-102	RESISTOR	1kΩ,1/6W
	R37	QRD161J-475	RESISTOR	4.7MΩ,1/6W
	R38	QRD161J-393	RESISTOR	39kΩ,1/6W
	R39	QRD161J-334	RESISTOR	330kΩ,1/6W
	R40	QRD161J-682	RESISTOR	6.8kΩ,1/6W
	R41	QRD161J-154	RESISTOR	150kΩ,1/6W
	R42	QRD161J-154	RESISTOR	150kΩ,1/6W
	R43	QRD161J-395	RESISTOR	3.9MΩ,1/6W
	R44	QRD161J-105	RESISTOR	1MΩ,1/6W
	R45	QRD161J-273	RESISTOR	27kΩ,1/6W
	R46	QRD161J-274	RESISTOR	270kΩ,1/6W
	R47	QRD161J-105	RESISTOR	1MΩ,1/6W
	R48	QRD161J-273	RESISTOR	27kΩ,1/6W
	R49	QRD161J-182	RESISTOR	1.8kΩ,1/6W
	R50	QRD161J-153	RESISTOR	15kΩ,1/6W
	R51	QRD161J-392	RESISTOR	3.9kΩ,1/6W
	R52	QRD161J-273	RESISTOR	27kΩ,1/6W
	R53	QRD161J-475	RESISTOR	4.7MΩ,1/6W
	R54	QRD161J-333	RESISTOR	33kΩ,1/6W
	R55	QRD161J-222	RESISTOR	2.2kΩ,1/6W
	R56	QRD161J-104	RESISTOR	100kΩ,1/6W
	R57	QRD161J-103	RESISTOR	10kΩ,1/6W
	R58	QRD161J-274	RESISTOR	270kΩ,1/6W
	R59	QRD161J-103	RESISTOR	10kΩ,1/6W
	R60	QRD161J-103	RESISTOR	10kΩ,1/6W
	R61	QRD161J-103	RESISTOR	10kΩ,1/6W
	R62	QRD161J-103	RESISTOR	10kΩ,1/6W
	R63	QRD161J-123	RESISTOR	12kΩ,1/6W
	R64	QRD161J-123	RESISTOR	12kΩ,1/6W
	R65	QRD161J-103	RESISTOR	10kΩ,1/6W
	R66	QRD161J-103	RESISTOR	10kΩ,1/6W
	R67	QRD161J-474	RESISTOR	470kΩ,1/6W
	R68	QRD161J-103	RESISTOR	10kΩ,1/6W
	R69	QRD161J-684	RESISTOR	680kΩ,1/6W
	R70	QRD161J-104	RESISTOR	100kΩ,1/6W
	R71	QRD161J-274	RESISTOR	270kΩ,1/6W
	R72	QRD161J-104	RESISTOR	100kΩ,1/6W
	R73	QRD161J-472	RESISTOR	4.7kΩ,1/6W
	R74	QRD161J-473	RESISTOR	47kΩ,1/6W
	R75	QRD161J-562	RESISTOR	5.6kΩ,1/6W
	R76	QRD161J-223	RESISTOR	22kΩ,1/6W
	R77	QRD161J-474	RESISTOR	470kΩ,1/6W
	R78	QRD161J-474	RESISTOR	470kΩ,1/6W
	R79	QRD161J-514	RESISTOR	510kΩ,1/6W
	R80	QRD161J-474	RESISTOR	470kΩ,1/6W

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
	R81	QRD161J-124	RESISTOR	120kΩ.1/6W
	R82	QRD161J-134	RESISTOR	130kΩ.1/6W
	R83	QRD161J-134	RESISTOR	130kΩ.1/6W
	R84	QRD161J-154	RESISTOR	150kΩ.1/6W
	R85	QRD161J-473	RESISTOR	47kΩ.1/6W
	R86	QRD161J-222	RESISTOR	2.2kΩ.1/6W
	R87	QRD161J-222	RESISTOR	2.2kΩ.1/6W
	R88	QRD161J-222	RESISTOR	2.2kΩ.1/6W
	R89	QVZ3521-105	V RESISTOR, SP SLOW TK PRE-SET	
	or	QVZ3521-105Z	V RESISEOR, SP SLOW TK PRE-SET	
	R90	QVZ3521-105	V RESISTOR, SP SLOW TK PRE-SET	
	or	QVZ3521-105Z	V RESISEOR, SP SLOW TK PRE-SET	
	R91	QRD161J-222	RESISTOR	2.2kΩ.1/6W
	R92	QRD161J-274	RESISTOR	270kΩ.1/6W
	R93	QRD161J-103	RESISTOR	10kΩ.1/6W
	R94	QRD161J-103	RESISTOR	10kΩ.1/6W
	R95	QRD161J-472	RESISTOR	4.7kΩ.1/6W
	R96	QRD161J-103	RESISTOR	10kΩ.1/6W
	R97	QRD161J-153	RESISTOR	15kΩ.1/6W
	R98	QRD161J-103	RESISTOR	10kΩ.1/6W
	R99	QRD161J-393	RESISTOR	39kΩ.1/6W
	R100	QRD161J-103	RESISTOR	10kΩ.1/6W
	R101	QRD161J-102	RESISTOR	1kΩ.1/6W
	R102	QRD161J-472	RESISTOR	4.7kΩ.1/6W
	R103	QRD161J-103	RESISTOR	10kΩ.1/6W
	R104	QRD161J-103	RESISTOR	10kΩ.1/6W
	R105	QRD161J-474	RESISTOR	470kΩ.1/6W
	R106	QRD161J-473	RESISTOR	47kΩ.1/6W
	R107	QRD161J-913	RESISTOR	91kΩ.1/6W
	R108	QRD161J-473	RESISTOR	47kΩ.1/6W
	R109	QRD161J-563	RESISTOR	56kΩ.1/6W
	R110	QRD161J-103	RESISTOR	10kΩ.1/6W
	R111	QRD161J-103	RESISTOR	10kΩ.1/6W
	R112	QRD161J-103	RESISTOR	10kΩ.1/6W
	R113	QRD161J-103	RESISTOR	10kΩ.1/6W
	R115	QRD161J-153	RESISTOR	15kΩ.1/6W
	R116	QRD161J-184	RESISTOR	180kΩ.1/6W
	R118	QRD161J-394	RESISTOR	390kΩ.1/6W
	R119	QRD161J-103	RESISTOR	10kΩ.1/6W
	R120	QRD161J-274	RESISTOR	270kΩ.1/6W
	R122	QRD161J-104	RESISTOR	100kΩ.1/6W
	R123	QRD161J-333	RESISTOR	33kΩ.1/6W
	R124	QRD161J-563	RESISTOR	56kΩ.1/6W
	R125	QRD161J-562	RESISTOR	5.6kΩ.1/6W
	R126	QRD161J-103	RESISTOR	10kΩ,1/6W
	R127	QRD161J-103	RESISTOR	10kΩ,1/6W
	R129	QRD161J-822	RESISTOR	8.2kΩ,1/6W
	C1	QCBB1HJ-102	CAPACITOR	0.001μF,50V
	C2	QEK61AM-226	E CAPACITOR	22μF,10V
	C3	QCSB1HJ-150	CAPACITOR	15pF,50V
	C4	QEK61HM-105	E CAPACITOR	1μF,50V
	C5	QFV71HJ-153	TF CAPACITOR	0.015μF,50V
	C6	QCBB1HJ-102	CAPACITOR	0.001μF,50V
	C7	QFV71HJ-103	TF CAPACITOR	0.01μF,50V
	C8	QCBB1HJ-102	CAPACITOR	0.001μF,50V
	C9	QEK61AM-226	E CAPACITOR	22μF,10V
	C10	QCBB1HJ-561	CAPACITOR	560pF,50V

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
	C11	QCBB1HJ-221	CAPACITOR	220pF,50V
	C12	QEK61HM-105	E CAPACITOR	1μF,50V
	C13	QCBB1HJ-102	CAPACITOR	0.001μF,50V
	C14	QEK61AM-226	E CAPACITOR	22μF,10V
	C15	QFL41HJ-332	M CAPACITOR	0.0033μF,50V
	C16	QCBB1HJ-101	CAPACITOR	100pF,50V
	C17	QCBB1HJ-101	CAPACITOR	100pF,50V
	C20	QCBB1HJ-102	CAPACITOR	0.001μF,50V
	C22	QEK61CM-106	E CAPACITOR	10μF,16V
	C23	QEK61CM-106	E CAPACITOR	10μF,16V
	C24	QFV71HJ-124	TF CAPACITOR	0.12μF,50V
	C25	QFL41HJ-682	M CAPACITOR	0.0068μF,50V
	C26	QCBB1HJ-471	CAPACITOR	470pF,50V
	C27	QFV71HJ-333	TF CAPACITOR	0.033μF,50V
	C28	QFV71HJ-334	TF CAPACITOR	0.33μF,50V
	C29	QEK61CM-106	E CAPACITOR	10μF,16V
	C30	QEK61CM-106	E CAPACITOR	10μF,16V
	C31	QEK61EM-475	E CAPACITOR	4.7μF,25V
	C32	QEK61EM-475	E CAPACITOR	4.7μF,25V
	C33	QFV71HJ-153	TF CAPACITOR	0.015μF,50V
	C34	QFV71HJ-564	TF CAPACITOR	0.56μF,50V
	C35	QCVB1CN-103	CAPACITOR	0.01μF,16V
	C36	QEK61CM-106	E CAPACITOR	10μF,16V
	C37	QEK61CM-106	E CAPACITOR	10μF,16V
	C38	QFV71HJ-473	TF CAPACITOR	0.047μF,50V
	C39	QFV71HJ-124	TF CAPACITOR	0.12μF,50V
	C40	QFV71HJ-393	TF CAPACITOR	0.039μF,50V
	C41	QFV71HJ-393	TF CAPACITOR	0.039μF,50V
	C42	QFV71HJ-393	TF CAPACITOR	0.039μF,50V
	C43	QCVB1CN-103	CAPACITOR	0.01μF,16V
	C44	QFL41HJ-681	M CAPACITOR	680pF,50V
	C45	QCBB1HJ-102	CAPACITOR	0.001μF,50V
	C46	QFL41HJ-681	M CAPACITOR	680pF,50V
	C47	QCVB1CN-103	CAPACITOR	0.01μF,16V
	C48	QFV71HJ-563	TF CAPACITOR	0.056μF,50V
	C49	QCVB1CN-103	CAPACITOR	0.01μF,16V
	C50	QCVB1CN-103	CAPACITOR	0.01μF,16V
	C51	QFV71HJ-393	TF CAPACITOR	0.039μF,50V
	C52	QFV71HJ-274	TF CAPACITOR	0.27μF,50V
	C53	QFV71HJ-823	TF CAPACITOR	0.082μF,50V
	C54	QCY71HJ-102	CAPACITOR	0.001μF,50V
	TP1	PU55774	TEST PIN, X3	
	CN1	PU58844-3	CAP HOUSING	
	CN2	PU59555-4	CAP HOUSING	
	CN3	PU58844-4	CAP HOUSING	
	CN4	PU58844-2	CAP HOUSING	
	CN5	PU58844-2	CAP HOUSING	
	CN6	PU58844-5	CAP HOUSING	
	CN7	PU58844-2	CAP HOUSING	
	CN8	PU59555-9	CAP HOUSING	
	CN9	PU59555-7	CAP HOUSING	
	CN10	PU58844-2	CAP HOUSING	
	CN11	PU58844-3Y	CAP HOUSING	
	CN12	PU58844-2	CAP HOUSING	

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	

DECK TERMINAL BOARD ASSEMBLY <51> <53>

PWBA	PB20013B-05	DECK TERMINAL BOARD ASSY	

—DECK TERMINAL BOARD ASSEMBLY <51>—

PWBA1	PB20013B1	DECK TERMINAL BOARD ASSY	
R1	QRD181J-151	RESISTOR	150Ω,1/8W
R3	QRD181J-331	RESISTOR	330Ω,1/8W
PS1	PU60271	PHOTO INTERRUPTER	
CN1	PU59933-16	WIRE TRAP	

—REC SAFETY BOARD ASSEMBLY <53>—

PWBA3	PB20013A3	REC SAFETY BOARD ASSY	
S1	PU58644-1-3	REC SAFETY SWITCH	

RELAY BOARD ASSEMBLY <52>

PWBA2	PB20013A2-01	RELAY BOARD ASSY	
LC1	PU59736-223	N FILTER	
LC2	PU59736-223	N FILTER	
WR2	PW30113-G0ABZ62	PARALLEL WIRE	
or	PW30118-G0ABZ62	PARALLEL WIRE	

END SENSOR BOARD ASSEMBLY <54>

PWBA4	PB20013A4	END SENSOR BOARD ASSY	
Q1	PN268R-NC	PHOTO TRANSISTOR	
CN1	PU59945-102	WIRE SOCKET	

CASSETTE HOUSING BOARD <56>

PWB1	PB30043	C.HOUSING PWB	
or	PB30097	C.HOUSING PWB	
Q1	PN268R-NC	PHOTO TRANSISTOR	
R1	QRD162J-471	RESISTOR	470Ω,1/6W
PHS1	PU58879	PHOTO INTERRUPTER	
CN1	PU59555-106	CAP HOUSING	

AUTO TRACKING BOARD ASSEMBLY <83>

⚠	REF. No.	PART No.	PART NAME, DESCRIPTION	
	PWBA	PB30098C-02	AUTO TRACKING BOARD ASSEMBLY	
	IC1	UPD4066BC	IC	
	or	BU4066B	IC	
	IC2	UPC324C	IC	
	or	LM324N	IC	
	Q1	2SC1740(RS)	TRANSISTOR	
	or	2SC1740S(RS)	TRANSISTOR	
	Q2	2SC1740(RS)	TRANSISTOR	
	or	2SC1740S(RS)	TRANSISTOR	
	Q3	2SC1740(RS)	TRANSISTOR	
	or	2SC1740S(RS)	TRANSISTOR	
	Q5	2SA1267(G)-TJK	TRANSISTOR	
	or	2SA1309(RS)	TRANSISTOR	
	or	2SA933S(RS)	TRANSISTOR	
	Q6	2SC1740(RS)	TRANSISTOR	
	or	2SC1740S(RS)	TRANSISTOR	
	Q7	DTC144WS	TRANSISTOR	
	Q8	DTC144WS	TRANSISTOR	
	D1	OA90	DIODE	
	D2	OA90	DIODE	
	D3	RD9.1EB3	ZENER DIODE	
	D5	1SS133	DIODE	
	or	MA165	DIODE	
	D6	1SS133	DIODE	
	or	MA165	DIODE	
	D7	1SS133	DIODE	
	or	MA165	DIODE	
	D8	1SS133	DIODE	
	or	MA165	DIODE	
	R1	QRD161J-104	RESISTOR	100kΩ,1/6W
	R2	QRD161J-104	RESISTOR	100kΩ,1/6W
	R3	QRD161J-102	RESISTOR	1kΩ,1/6W
	R4	QRD161J-102	RESISTOR	1kΩ,1/6W
	R5	QRD161J-683	RESISTOR	68kΩ,1/6W
	R6	QRD161J-562	RESISTOR	5.6kΩ,1/6W
	R7	QRD161J-222	RESISTOR	2.2kΩ,1/6W
	R8	QRD161J-101	RESISTOR	100Ω,1/6W
	R9	QRD161J-104	RESISTOR	100kΩ,1/6W
	R10	QRD161J-332	RESISTOR	3.3kΩ,1/6W
	R11	QRD161J-103	RESISTOR	10kΩ,1/6W
	R12	QRD161J-104	RESISTOR	100kΩ,1/6W
	R13	QRD161J-104	RESISTOR	100kΩ,1/6W
	R14	QRD161J-105	RESISTOR	1MΩ,1/6W
	R15	QRD161J-105	RESISTOR	1MΩ,1/6W
	R16	QRD161J-105	RESISTOR	1MΩ,1/6W
	R17	QRD161J-564	RESISTOR	560kΩ,1/6W
	R18	QRD161J-103	RESISTOR	10kΩ,1/6W
	R20	QRD161J-434	RESISTOR	430kΩ,1/6W
	R23	QRD161J-822	RESISTOR	8.2kΩ,1/6W
	R24	QRD161J-123	RESISTOR	12kΩ,1/6W
	R25	QRD161J-103	RESISTOR	10kΩ,1/6W
	R26	QRD161J-103	RESISTOR	10kΩ,1/6W
	R27	QRD161J-682	RESISTOR	6.8kΩ,1/6W
	R28	QRD161J-103	RESISTOR	10kΩ,1/6W
	R29	QRD161J-102	RESISTOR	1kΩ,1/6W
	C1	QCVB1CM-103	CAPACITOR	0.01μF,16V
	C2	QCBB1HJ-271	CAPACITOR	270pF,50V
	C4	QCVB1CM-103	CAPACITOR	0.01μF,16V
	C5	QCVB1CM-103	CAPACITOR	0.01μF,16V
	C7	QCVB1CM-103	CAPACITOR	0.01μF,16V
	C8	QCVB1CM-103	CAPACITOR	0.01μF,16V
	C9	QCVB1CM-103	CAPACITOR	0.01μF,16V
	C10	QER61CM-106	E CAPACITOR	10μF,16V
	C11	QER61CM-106	E CAPACITOR	10μF,16V
	C12	QCVB1CM-103	CAPACITOR	0.01μF,16V
	C13	QFV71HJ-473	TF CAPACITOR	0.047μF,50V
	C14	QCVB1CM-103	CAPACITOR	0.01μF,16V
	L2	PU59152-270J	COIL	27μH
	TP1	PU55774	TEST PIN	
	TPGND	PU55774	TEST PIN	
	CN1	PU58844-104	CAP HOUSING	
	CN2	PU58844-2	CAP HOUSING	
	CN3	PU58844-102R	CAP HOUSING	
	CN4	PU58844-102	CAP HOUSING	

E. & O. E. No. 82144

SECTION 6
TECHNICAL INFORMATIONS

6.1 MECHANISM CONTROL CIRCUIT

6.1.1 IC601 Pin function

Pin No.	Symbol	I/O format	Label	I/O	Contents
1	VDD	—	VDD	I	for the System Power
2	Vref	—	Vref	I	for A-D/D-A Convertor
3	DA	Analog	D-A	O	for Motor Drive
4	PWM	PWM	PWM	O	for Motor Drive
5	Port 6 4	N-ch OPEN DRAIN	FF		
6	Port 6 3		F. E. H CTL	O	FRYING ERASE HEAD CONTROL (ERASE ON:L)
7	Port 6 2		LP SPCL	O	LP MODE PLAYBACK : L
8	Port 6 1		LED DATA	O	16 Bit Serial Data for LED Control
9	Port 6 0		REV	O	Rev Mode : H
10	Port 4 7		OP 1	I	
11	Port 4 6		OP 2	I	
12	Port 4 5		AVRG FM	I	AVERAGE FM (Auto Tracking Check Data)
13	Port 4 4		JS B	I	JOG PULSE INPUT
14	Port 4 3		STL	I	SHUTTLE SWITCH (L)
15	Port 4 2		JS A	I	JOG PULSE INPUT
16	Port 4 1		V FM	O	FM SIGNAL SELECT (VIDEO FM/AUDIO FM), V FM : H
17	Port 4 0		C. S. REF	—	Not used
18	Port 3 7		EXP 2 DATA	O	12 bit SERIAL DATA for SERVO control
19	Port 3 6		LP SEARCH	—	Not used
20	Port 3 5		NC	—	NC
21	Port 3 4		SLOW DATA	O	Slow Tracking Control
22	Port 3 3		S. CLOCK	O	CLOCK
23	Port 3 2		CAP FG	I	MODE DETECT/BACK SPACE COUNT
24	Port 3 1		S. DATA	O	16 bit SERIAL DATA for SERVO IC Control
25	Port 3 0		INDEX	I/O	INDEX DATA DETECT/WRITE IN
26	INT-1		REMOTE	I	16 bit Remote Data IN (A/B code)
27	CN Vss		CN Vss	I	GND
28	RESET		RESET	I	AC IN RESET
29	X IN	—	X IN	I	SYSTEM CLOCK 6 MHz
30	X OUT		X OUT	O	
31			ϕ	—	NC
32	CN Vss		GND	I	GND
33	Port 5 7	with Input Latch	CTL PULSE	I	MODE DETECT
34	Port 5 6		DRUM FF	I	DRUM rotation detect, REC Timing Control
35	Port 5 5		SUP FG	I	REEL Rotation detect
36	Port 5 4		TU FG	I	/ TENSION CONTROL
37	Port 5 3	High Impedance	CASS SW	I	CASSETTE LOADING/UNLOADING DETECT
38	Port 5 2		R. PAUSE	I	REMOTE PAUSE INPUT- PAUSE ON : L
39	Port 5 1		MODE SENS A	I	MECHANISM MODE DETECT
40	Port 5 0		MODE SENS B	I	
41	Port 1 7	N-ch OPEN DRAIN	REC SF	I	Detects erase protect tab - Tab absent : H
42	Port 1 6		START SENS	I	START SENSOR, READER TAPE DETECT ON : L
43	Port 1 5		END SENS	I	END SENSOR, TRAILLER TAPE DETECT ON: L
44	Port 1 4		EDIT SW	I	PRE-ROLL SW - SW OFF : L
45	Port 1 3		P. CTL	O	POWER CONTROL - P. ON : L
46	Port 1 2		H. REC START	O	HiFi REC START ON : L
47	Port 1 1		D.O. CTL	I	HiFi FM LOSS OR NORMAL AUDIO ONLY : L
48	Port 1 0		MUTE	O	MUTE ON : L
49	Port 0 7		A. REC	O	AUDIO REC : L
50	Port 0 6		EXP DATA	O	12 bit SERIAL DATA
51	Port 0 5		SP	O	SP MODE ; L
52	Port 0 4		V. REC START	O	VIDEO REC START : L
53	Port 0 3		CAP +	O	CAPSTAN MOTOR DRIVE CAPSTAN FORWARD : L
54	Port 0 2		CAP −		CAPSTAN REVERSE : L
55	Port 0 1		REEL +	O	REEL MOTOR DRIVE REEL FORWARD : L
56	Port 0 0		REEL −		REEL REVERSE : L
57	Port 2 7	C-MOS	LCM 3	O	LOADING and CASSETTE MOTOR CONTROL
58	Port 2 6		LCM 2		
59	Port 2 5		LCM 1		
60	Port 2 4		STROBE	O	DATA TRANSFER AT LOW
61	Port 2 3		DATA 3	I/O	TM bus 4 bit
62	Port 2 2		DATA 2		
63	Port 2 1		DATA 1		
64	Port 2 0		DATA 0		

6.2 TIMER CIRCUIT

6.2.1 IC1 pin function

Pin No.	Symbol	Label	I/O	Contents
1	S3	KS D	O	KEY SCAN PULSE OUTPUT
2	S2	KS C	—	NC
3	S1	KS B		
4	S0	KS A		
5	P00/INT4	POWER DOWN	I	POWER LOSS DETECT INPUT
6	P01/SCK	DSP SCK	O	18 bit SERIAL DATA to DISPLAY Circuit (IC101)
7	P02/SO	DSP S. DATA		
8	P03/SI	TEST	I	TEST POINT
9	P10/INT0	REMOTE	I	16 bit REMOTE DATA (A/B code)
10	P11/INT1	NC	—	NC
11	P12/INT2	TU BUSY	O	DATA TRANSFER AT LOW
12	P13/T10	CNT PULSE	I	LINER TIME COUNTER DATA INPUT (1/25 COUNT DOWN)
13	P20	M DATA 0	I/O	TM (Timer/M-CTL CPU) bus
14	P21	M DATA 1		
15	P22	M DATA 2		
16	P23/BUZ	M DATA 3		
17	P30	DSP CE	O	DISPLAY DATA CHIP ENABLE to IC101, DATA TRANSFER AT LOW
18	P31	SDA	I/O	VPS/VPV ADAPTER (DATA BUS)
19	P32	SCL	O	
20	P33	NC	—	NC
21	P60	TNR DATA 0	O	PLL TUNING DATA bus (4 bit)
22	P61	TNR DATA 1		
23	P62	TNR DATA 2		
24	P63	TNR DATA 3		
25	P40	KS 0	I	KEY SCAN DATA INPUT
26	P41	KS 1		
27	P42	KS 2		
28	P43	KS 3		
29	PP0	FMA CTL	O	INPUT SELECT (TU:H/SIML:M/AUX:L)
30	X1	X1	I	MAIN SYSTEM CLOCK (4.194304MHz)
31	X2	X2	O	
32	Vss	Vss	I	GND
33	XT1	XT2	I	GND
34	XT2	XT1	—	NC
35	P50	AUX	O	INPUT SELECT (AUX(OCH) MODE : H)
36	P51	TU STROBE		DATA TRANSFER AT LOW
37	P52	M STROBE		DATA TRANSFER AT LOW
38	P53	TEXT		TEXT MODE : L
39	RESET	RESET	I	AC IN RESET
40	T0	NC	—	NC
41	T1	NC		
42	T2	NC		
43	T3	NC		
44	T4	NC		
45	T5	MC		
46	T6	NC		
47	T7	NC		
48	T8	NC		
49	T9	NC		
50	T10/S15/PH3	RST OUT	O	TUNER (IC 1) : RESET
51	T11/S14/PH2	NC	—	NC
52	T12/S13/PH1	NC		
53	T13/S12/PH0	SIMUL	O	SIMULCAST : H
54	T14/S11	KS L	O	KEY SCAN PULSE OUTPUT
55	T15/S10	KS K		
56	VLOAD	V LOAD	I	GND
57	VPRE	V PRE		
58	S9	KS J	O	KEY SCAN PULSE OUTPUT
59	S8	KS I		
60	S7	KS H		
61	S6	KS G		
62	S5	KS F		
63	S4	KS E		
64	VDD	VDD	I	for the SYSTEM POWER